24 November 2016

STAGES 1A AND 3 OF HUAPAI TRIANGLE SUB PRECINCT B, HUAPAI

GEOTECHNICAL COMPLETION REPORT

CABRA DEVELOPMENTS LIMITED

Ref: 2015_1127AE Rev: 0

Table of Contents

Appendices

1. INTRODUCTION

In accordance with our instructions, this Geotechnical Completion Report has been prepared for Cabra Developments Limited as part of the documentation to be submitted to Auckland Council following earthworks to form Stages 1A and 3 of the residential development at Huapai Triangle Sub Precinct B, Huapai. Construction of this residential subdivision has been undertaken in accordance with the Auckland Council Resource Consent numbers SLC-63594 and REG-63595 and Engineering Approval letter referenced ENG-2015-473 dated 10 February 2016 for the original engineering plans, and Engineering Approval letter referenced ENG-486 dated 18 July 2016 for Variation A of the Engineering Plans. Specific structures constructed during the civil works to create the subdivision include timber pole retaining walls and segmental block retaining walls.

This report contains our Suitability Statement, specific comments related to items raised in the Resource Consent, relevant test data and the Cato Bolam Consultants Limited as-built plan set as provided in Appendix B.

This report covers the construction period late November 2015 to November 2016 and is intended to be used for certification purposes for new lots (listed below) created from Lot 1 of DP 318693, Lot 2 of DP 318693, Lot 2 of DP 137997 and Lot 4 of DP 435299 as follows:

- 28 new residential lots numbered 3 to 15, 26 to 38 being standard residential lots, lots 200 and 201 being superlots;
- 3 new roads numbered Road 1, Road 3 ad Road 5 within lots 400 and 401;
- 1 Jointly Owned Access Lot (JOAL) numbered lot 300;
- 1 Recreation Reserve numbered lot 500;
- 2 Road Reserves numbered lots 119 and 411;
- 1 Drainage Reserve with a stormwater detention device numbered lot 501.

These stages of the Huapai Triangle Sub Precinct B residential development are located off Nobilo and Station Roads. As can be seen from the as-built plans, 15 of the lots have been affected by filling as part of the earthworks operations to a maximum depth of approximately 7 metres.

2. PROJECT BACKGROUND

The geotechnical investigations and design were undertaken by CMW, presented in our report entitled Geotechnical Investigation Report, Cnr Station Road and Nobilo Road, Huapai, referenced 2015_1127AB Rev.2 dated 24 August 2015. This document included the earthworks specification which was used as part of the quality assurance testing carried out for the earthworks for all stages of the subdivision.

The conclusions and recommendations within this report have been reviewed in preparation of this report.

3. DESCRIPTION OF EARTHWORKS

Works on these stages of the development were undertaken in conjunction with surrounding future stages areas.

Earthworks subcontractor Bob Hick Earthmoving Limited mobilised to site at the end of November 2015 to begin topsoil stripping operations and muckout of the north western gully area across lots 7 to 14 to be used as a temporary silt pond. Subsoil drainage was installed within the base of the gully muckout as part of these works and temporarily outlet to the paddocks within the neighbouring property.

Muck out of the permanent stormwater detention device directly east of the eastern gully took place at around the same time with fills placed to form the pond clay liner. CMW undertook regular testing of the liner to confirm compaction and air voids of the fill in accordance with the specifications.

Muckout of the larger western gully was undertaken throughout January 2016, which included subsoil drainage installed within the gully base and outlet temporarily into the silt retention pond at the southern end of the site.

Cut to fill operations started in early December 2015 with the placement of fill along the north western gully across lots 201 to 14 with site won material being cut from the south eastern gully across future stages in lots 86 to 203. Fill operations extended across lots 1 to 6 from mid December 2015 onwards with earthworks operations concentrating on conditioning the central ridge.

Fill operations extended across the northern side of lot 201 towards the end of December 2015 with several lots at finished level. Contractors started placing topsoil across lots 7 and 8 and focussed on undercutting the reserve area (lot 500) to required levels for placement of compacted topsoil. Subsoil drainage previously placed within the north western gully was brought through to beneath the reserve area and up beneath Road 1 to tap areas of seepage and help maintain drainage within the reserve area long term.

Contractors moved onto topsoil stripping along the western side of the site and continued backfilling lot 500 with topsoil compacted in layers. Operations progressed towards the muck out of the south eastern gully across future stages in lots 98 to 107 with the deepest cut depth extending to approximately 7 metres below the finished level.

Timber pole retaining wall construction began at the start of February 2016 with contractors starting drilling operations along future stages in lots 44 and 43. Timber pole retaining wall construction operations continued progressively across the site until May 2016.

By mid February 2016, service lines were being laid during which backfilled trenches were tested by CMW to confirm compaction. By the end of February earthworks operations slowed down due to weather conditions deteriorating. Trimming of roads across the western portion of the site began in early March 2016 with undercuts occurring along portions of Roads 1, 2 and 3, backfilled with engineered fill. These works continued throughout March 2016.

By mid March 2016 topsoil operations resumed across the central gully with most of the lots having reached finished level. Minor earthworks were also being undertaken on future stages in lots 16 to 25 to reach finished levels. Combined service ducting and lot connections were completed progressively across the initial stages during this time.

Earthworks operations resumed on the eastern side of the site across future stages in lot 98 to 105 at the start of April 2016. By mid April, the permanent stormwater detention device was topsoiled with geotextile and boulders being placed before and after the stormwater pipework. Earth fill operations came to an end towards the end of April and the stormwater detention device completed.

All roads across site were lime stabilised at the start of May 2016 and subsequently trimmed to subgrade and metalled. Timber pole retaining wall construction continued during this time with CMW doing regular inspections confirmed all construction aspects of the retaining walls being built across site.

Gravity wall construction began start of July 2016 with construction of walls extending until the end of November 2016. Completion of Stage 1A and 3 areas including roading, footpaths, street lights, raingardens, planting, fencing/balustrades etc. were completed between August and November 2016.

4. GEOTECHNICAL QUALITY CONTROL

4.1. Site Observations

During the earthworks site visits were typically undertaken several times each week to assess compliance with NZS 4431 and specific design recommendations and specifications.

Site visits were carried out to observe and confirm compliance relating to:

- Adequate topsoil stripping;
- Fill areas prior to the placement of fill materials to ascertain that all mullock and soft inorganic subsoils had been removed;
- Installation of subsoil drains including underfill drains but excluding road under-channel drains;
- Backfilling of subsoil drains;
- Excavation and backfilling of sewer and stormwater trenches;
- Construction of cantilever pole retaining walls including ground conditions, pile size, spacing and depth; and
- Construction of segmental block walls including foundation and retained soil ground conditions, block and grid placement, hardfill compaction and drainage; and
- Placement and compaction of engineered fills.

4.2. Compaction Control

Compaction of engineered earth fills was controlled by undrained shear strength measured by hand held shear vane calibrated using the NZGS 2001 method and by air voids as defined by NZS4402.

The criteria for undrained shear strength were a minimum single value of 110 kPa and minimum average of any 10 consecutive tests of 140 kPa.

The criteria for air voids were a maximum single value of 12% and maximum average of any 10 consecutive tests of 10%.

Vane shear strength, water content and in situ density tests were carried out on all areas of the engineered filling to at least the frequency required by the project specification.

These tests showed on some occasions that the required compaction standards were not being achieved and to the best of our knowledge the failing areas of fill were re-worked as necessary. Subsequent testing confirmed compliance with the specification.

5. EVALUATION OF COMPLETED EARTHWORKS

5.1. Retaining Walls

Several cantilever pole retaining walls and segmental block retaining walls have been constructed in the locations shown on the appended Final Contour & Retaining Wall As Built Plans.

These walls reach a maximum height of approximately 1.7 metres and were designed and observed by this consultancy. A copy of the Producer Statement – Construction Review is provided in Appendix E.

Descriptions of the building and earthworks restrictions within the vicinity of this wall are contained in the Suitability Statement in Appendix A. The Retaining Wall Specific Design Plans appended depict these restrictions for each lot affected.

Outlets for the rear drainage for the walls terminate within lot boundaries. These drainage outlets are required to be connected to the private drainage for the affected lots as part of construction of the dwellings. Lots affected by drainage outlet locations are designated on the appended GCR Summary Table.

5.2. Land Stability and Erosion Control

On all steep land, surface stability can be compromised by indiscriminate disposal of stormwater onto the ground surface and/ or by removal of vegetation.

Building and landscape designers must ensure that all runoff from solid surfaces is directed into the stormwater system. It is also important that care is paid to the disposal of stormwater during construction so that concentrated discharges (e.g. from unconnected spouting) are not directed towards steep ground.

Any vegetation cleared beyond the immediate area of building platforms for temporary construction purposes should be replanted or replaced as soon as possible. The roots of an established vegetation cover can serve to bind the surface soils while the foliage can reduce rain infiltration and soil saturation, resulting in better resistance to erosion and shallow slumping.

5.3. Fill Induced Settlement

The majority of the filling on this stage of the development was placed prior to May 2016. A series of settlement markers was installed in areas of deep fill at its completion and have been periodically monitored for both horizontal and vertical movements. Horizontal changes have been noted to be within the survey accuracy limits, while vertical movements are depicting seasonal shrink/ swell variations as anticipated.

On the basis of the results, we are satisfied that t_{90} primary consolidation settlement has been achieved here and that fill induced settlement does not pose a hazard to NZS 3604 type building development.

5.4. Service Line Trenches

As part of the civil works, stormwater services were trenched throughout the development as shown on the appended Stormwater Reticulation As-built Plans.

Stormwater trenches in key locations contained a punched draincoil to facilitate draining of any groundwater seepages within the trench bedding. These draincoils are connected to the downstream stormwater manholes. This drainage has been installed as a precautionary measure that is not considered to be necessary for private connections.

As is normal on all subdivisions, building developments involving foundations within a 45 degree zone of influence from pipe inverts will require engineering input. The Auckland Council drawing referenced SW22 provided in Appendix B extracted from Chapter 4 of the Auckland Council Code of Practice for Land development and Subdivision depicts their requirements for stormwater pipes. The majority of lots are known to have service trenches within the lot boundaries as shown on the appended Drainage Zone of Influence Plans.

Resulting restrictions are presented in the Suitability Statement below, together with a table of the affected lots.

5.5. Subsoil Drains

The appended Cut Fill As Built Plans show the positions of underfill drains which were constructed in the natural ground within the gully areas during the earthworks operations. The drains were installed

to help control groundwater levels and are extended through to the adjacent subdivision. The ongoing operation of these drains is important to the overall stability conditions of the site.

As these were installed within the base of the gully areas there is typically at least 4 metres fill over the drains within lot areas and therefore they are not expected to be encountered as part of typically shallow foundation construction for residential dwellings. Construction involving piled foundations and or future retaining structures should be designed to avoid these drains to preserve their continued operation.

Descriptions of the restrictions are contained in the appended Suitability Statement. Lots 11 to 14 and 201 are known to be affected by these restrictions.

5.6. Road Subgrades

Penetration resistance testing was carried out on the road subgrades during construction and the results of this testing were forwarded to Cato Bolam Consultants Limited for pavement remedial design. Where soft ground with low equivalent CBR values was identified it was generally undercut and geogrid and geotextile cloth was installed. All road subgrade areas were subsequently lime/ cement stabilised to achieve appropriate CBR values.

Benkelman Beam testing of the base course was carried out by Roadtest Limited on each road and those results were also forwarded to Cato Bolam Consultants.

5.7. Design of Shallow Foundations

5.7.1. Bearing Capacity

Once bulk earthworks and top-soiling of the building platforms had been completed, our staff drilled hand auger boreholes on platforms in natural ground to determine representative finished ground conditions and hence evaluate likely foundation options for future building development. Our assessments of bearing capacity for the design of shallow foundations on each building platform are contained in the appended Suitability Statement.

At current subgrade levels lots 3 to 15, 26 to 29, 31 to 38, 200 and 201 inclusive have been assessed as having a geotechnical ultimate bearing capacity of 300 kPa within the influence of conventional shallow residential building foundation loads. However on account of the presence of soft natural sub soils, a geotechnical ultimate bearing capacity of 240 kPa has been assessed for lot 30.

If higher geotechnical ultimate bearing capacities are required, further specific site investigation and design of foundations should be carried out prior to Building Consent application.

5.7.2. Foundation Settlements

At the bearing pressures specified above and subject to the design requirements for soil expansiveness provided below, differential settlement of shallow foundations for buildings designed in accordance with NZS 3604 (including the 600mm subfloor fill depth limit) should be within code limits.

5.7.3. Soil Expansiveness Classification

17 sets of soil tests were carried out on samples taken from likely foundation level across the entire subdivision as part of the completion fieldwork.

Testing was carried out in accordance with NZS 4402, "Methods of Testing Soils for Civil Engineering Purposes" test 2.2 and 2.6 and were used in conjunction with visual-tactile assessment of the site soils to determine expansive site Classes as defined in AS 2870, "Residential Slabs and Footings – Construction". All test results are appended.

On this basis we have assessed the AS 2870 Site Class for all lots these stages of the development to be H2 (high). Details of foundation options for this Class are contained in the appended Suitability Statement.

In recent years in Auckland, there have been examples of concrete floors and/ or foundations that have been poured on dry, desiccated subgrades in summer months on expansive soils and have Foundation contractors need to be made aware of this issue and the need to maintain appropriate moisture contents in the footings and building platform subgrade between the time of excavation and the pouring of concrete.

Remedial actions that may be appropriate include platform protection with a hard fill layer, pouring of a blinding layer of concrete in footing bases and soaking of the building platform with sprinklers for an extended period.

Home owners need to be aware that the planting of high water demand plants where their roots may extend close to footings can also cause settlement damage.

5.8. Topsoil Depths

Topsoil depths have been checked by the drilling of a borehole in the approximate centre of the building platform on each lot. The results are considered indicative for each lot, but may be subject to variations. Topsoil depths are between 150 and 300mm on these stages of the development.

Site specific findings are contained in the appended GCR Summary Table (Appendix A). However, it is possible that further levelling works have been undertaken since our investigations and accordingly, we strongly recommend that lot purchasers complete their own checks of topsoil depths.

5.9. Stormwater Detention Device

A stormwater detention device has been constructed as part of this stage of the subdivision. This device is formed as a series of vegetated swales connected by stormwater pipes with rock armouring surrounding the inlet and outlets of the pipework.

The device was formed mostly within cut with the eastern end of the device filled as part of the gully works. The cut ground was inspected by CMW during the course of the works to confirm the natural soils were highly plastic clays as anticipated based on the investigations previously.

Permeability testing of these natural soils confirmed a hydraulic conductivity (K) in the order of 10^{-6} m/s. Borehole investigations undertaken within the vicinity of the stormwater detention device confirmed that groundwater levels were not present within 2 metres of the finished levels of the device.

Design flow rates for the detention device are as follows:

- 2 year ARI event: 0.292m^3/s
- 10 year ARI event: 0.782m^3/s
- 100 year ARI event: 1.126m^3/s

Data from NIWA for the West Auckland area suggests soil moisture deficits through evaporation/transpiration within the summer months of November through to February are likely to have an average deficit of less than 200mm. No specific evaporation tests have been carried out for the device during its commissioning.

On the basis of the construction observations undertaken during the subdivision formation we are satisfied that the stormwater detention device has been constructed in accordance with the design and is suitable for its intended purpose.

6. CLOSURE

The appended Statement of Professional Opinion is provided to the Auckland Council and Cabra Developments Limited for their purposes alone on the express condition that it will not be relied upon by any other person. It is important that prospective purchasers satisfy themselves as to any specific conditions pertaining to their particular land interest.

Although regular site visits have been undertaken for observation, for providing guidance and instruction and for testing purposes, the geotechnical services scope did not include full time site presence. To this end, our appended Suitability Statement also relies on the Contractors' work practices and assumes that when we have not been present to observe the work, it has been completed to high standards and in accordance with the drawings, instructions and consent conditions provided to them.

Similarly it assumes that all as-built information and other details provided to the Client and/or CMW by other members of the project team are accurate and correct in all respects.

For and on behalf of
CMW Geosciences (NZ) Limited

Prepared by:

Greg Snook

Project Engineering Geologist

Reviewed and Approved by:

Richard Knowles

Principal Geotechnical Engineer CPEng

Appendix A

Statement of Professional Opinion as to the Suitability of Land for Building Development

STATEMENT OF PROFESSIONAL OPINION AS TO THE SUITABILITY OF LAND FOR BUILDING DEVELOPMENT

I, R.J. Knowles, of CMW Geosciences (NZ) Limited, Auckland, hereby confirm that:

1. As a Chartered Professional Engineer experienced in the field of geotechnical engineering, I am a Geo-professional as defined in Section 1.2.2 of NZS 4404 and was retained by the Developer as the Geotechnical Engineer on Stages 1A and 3 of the Huapai Triangle Sub Precinct B Development.

2. The extent of preliminary investigations carried out to date are described our Geotechnical Investigation Report referenced 2015_1127AB Rev.2, dated 24 August 2015. The conclusions and recommendations of that document have been re-evaluated in the preparation of this report. The results of all tests carried out are also appended.

3. In my professional opinion, not to be construed as a guarantee, I consider that:

   (a) The earth fills shown on the appended Cato Bolam Consultants Cut Fill As-built Plans have been placed in compliance with NZS 4431, the Auckland Council Code of Practice for Subdivision and Land Development and related documents.

   (b) The completed earthworks give due regard to land slope and foundation stability considerations on the building platform areas.

   (c) **Specific Design Zone (Retaining Walls) areas** have been applied on all Lots for the protection of the function of the retaining walls. No building construction and no earthworks (i.e. cut or fills of any depth) should take place within the designated **Specific Design Zone (Retaining Walls) areas** unless endorsed by a Chartered Professional Engineer experienced in geomechanics and familiar with the contents of this report. The endorsement will need to consider the stability implications of the earthworks and building proposals on the retaining walls so that the walls are neither overloaded nor undermined. The extents of these areas are depicted on the appended Retaining Wall Specific Design Plans.

   (d) The function of the subsoil drains installed beneath Lots 11 to 14 and 201 inclusive must not be impaired by any building development or landscaping works. Any bored or driven piles must be positioned to avoid damaging the draincoils. Where any subsoil drain is intercepted by building works, it must be reinstated under the direction of a Chartered Professional Engineer to ensure the integrity of the subsoil drainage system.

   (e) The retaining wall drainage outlets on Lots 4, 6, 9, 10, 14, 37 and 200 inclusive must be connected to the private drainage systems as part of construction of residential dwellings in their respective lots. Locations are depicted on the appended Final Contour & Retaining Wall As-built Plans.

   (f) A geotechnical ultimate bearing capacity of 300 kPa may be assumed for shallow foundation design on the building platforms of Lots 3 to 15, 26 to 29, 31 to 38, 200 and 201 inclusive.

   Due to the presence of softer natural subsoils on the building platforms of Lot 30 a geotechnical ultimate bearing capacity of 240 kPa may be assumed for shallow foundation design on these lots.

   If for any reason higher geotechnical bearing capacities are required, further specific site investigation and design of foundations should be carried out prior to Building Consent application.

(g) The expansive site Class for all lots has been assessed as AS2870 Class H2 (high). We recommend that building designers note on the Building Consent drawings the need to maintain appropriate moisture levels across building subgrades and in footing excavations (as described in Section 5.7.3 of the Geotechnical Completion Report) for reference by foundation contractors.

(h) The backfilling and compaction of the storm water trenches on this subdivision has been carried out to appropriate standards having regard for the prevailing ground conditions and associated compaction induced pipe loadings.

However, no building development should take place within the 45 degree zone of influence of drain inverts unless endorsed by specific design and by construction inspections undertaken by a Chartered Professional Engineer experienced in geomechanics to ensure that lateral stability and differential settlement issues are addressed and that building loads are transferred beyond the influence of the pipe and trench backfill. This influence line is depicted on the appended Drainage Zone of Influence Plans. A copy of drawing SW22 extracted from Chapter 4 of the Auckland Council Code of Practice for Land development and Subdivision this document is provided in Appendix B for clarification

(i) Subject to the geotechnical limitations, restrictions and recommendations contained in clauses 3(c), 3(d), 3(e) 3(f), 3(g) and 3(h) above:

(i) The filled and natural ground is generally suitable for residential buildings constructed in accordance with NZS 3604 and the requirements of AS2870 for the appropriate expansive soil class.

(ii) Where shallow foundations are appropriate, design may be carried out in accordance with AS 2870 (Class H2) or alternately, a specific foundation and structural design may be undertaken by a Chartered Professional Engineer.

4. Road subgrades have been formed with appropriate regard for slope stability and settlement risks.
5. Construction of the permanent stormwater detention device has been formed to standards appropriate for its intended use.

The following table summarises the conditions on each of each residential lots.

For and on behalf of
CMW Geosciences (NZ) Limited

Richard Knowles

Principal Geotechnical Engineer, CPEng

GCR SUMMARY TABLE

Condition	Specific Design Zone (retaining)	Retaining Wall Drainage Outlets Present	Subsoil Drains Present	Geotechnical Ultimate Bearing Capacity (kPa)	AS2870 Expansive Class	Service Lines Restrictions	Indicative Topsoil Depth (mm)
GCR SOPO Clause	**3(c)**	**3(e)**	**3(d)**	**3(f)**	**3(g)**	**3(h)**	
Lot number							
3	●			300	H2	●	250
4	●	●		300	H2	●	250
5	●			300	H2	●	250
6	●	●		300	H2	●	250
7	●			300	H2	●	150
8	●			300	H2		150
9	●	●		300	H2	●	200
10	●	●		300	H2		200
11	●		●	300	H2	●	150
12	●		●	300	H2	●	200
13	●		●	300	H2	●	200
14	●	●	●	300	H2	●	200
15	●			300	H2	●	280
26	●			300	H2	●	250
27	●			300	H2	●	300
28	●			300	H2	●	250
29	●			300	H2	●	250
30	●			240	H2	●	200
31	●			300	H2	●	300
32	●			300	H2	●	250
33	●			300	H2	●	200

Condition	Specific Design Zone (retaining)	Retaining Wall Drainage Outlets Present	Subsoil Drains Present	Geotechnical Ultimate Bearing Capacity (kPa)	AS2870 Expansive Class	Service Lines Restrictions	Indicative Topsoil Depth (mm)
GCR SOPO Clause	**3(c)**	**3(e)**	**3(d)**	**3(f)**	**3(g)**	**3(h)**	
Lot number							
34	●			300	H2	●	200
35	●			300	H2	●	200
36	●			300	H2		250
37	●	●		300	H2	●	150
38	●			300	H2	●	250
200	●	●		300	H2	●	200
201	●		●	300	H2	●	200

Appendix B

Cato Bolam Consultants As-built Drawings and Detail Drawings

Title	Reference No.	Date	Revision
COVER SHEET	32522-E00	NOV 2016	-
FINAL CONTOUR & RETAINING WALL AS BUILT PLANS (3 SHEETS)	32522-E600 TO E602	NOV 2016	-
CUT FILL AS BUILT PLANS (3 SHEETS)	32522-E603 TO E605	NOV 2016	-
ROAD AS BUILT PLANS (3 SHEETS)	32522-E606 TO E608	NOV 2016	-
WASTEWATER RETICULATION AS BUILT PLANS (3 SHEETS)	32522-E609 TO E611	NOV 2016	-
STORMWATER RETICULATION AS BUILT PLANS (4 SHEETS)	32522-E612 TO E615	NOV 2016	-
WATER RETICULATION AS BUILT PLANS (3 SHEETS)	32522-E616 TO E618	NOV 2016	-
RETAINING WALL SPECIFIC DESIGN PLANS (2 SHEETS)	32522-E619 TO E620	NOV 2016	-
DRAINAGE ZONE OF INFLUENCE PLANS (2 SHEETS)	32522-E621 TO E622	NOV 2016	-
AUCKLAND COUNCIL STORMWATER PIPE AND MANHOLE CONSTRUCTION CLEARANCE REQUIREMENTS	SW22	SEP 2013	1

Cabra Developments Ltd
Huapai Triangle
Sub - Precinct B
Asbuilt Plans Stage 1A & 3
Huapai

As Built Plan Set

E00	Cover Sheet
E600	Final Contours - Sheet 1 of 3
E601	Final Contours - Sheet 2 of 3
E602	Final Contours - Sheet 3 of 3
E603	Cut Fill - Sheet 1 of 3
E604	Cut Fill - Sheet 2 of 3
E605	Cut Fill - Sheet 3 of 3
E606	Roading - Sheet 1 of 3
E607	Roading - Sheet 1 of 3
E608	Roading - Sheet 1 of 3
E609	Waste Water Reticulation - Sheet 1 of 3
E610	Waste Water Reticulation - Sheet 2 of 3
E611	Waste Water Reticulation - Sheet 3 of 3
E612	Stormwater Reticulation - Sheet 1 of 4
E613	Stormwater Reticulation - Sheet 2 of 4
E614	Stormwater Reticulation - Sheet 3 of 4
E615	Stormwater Reticulation - Sheet 4 of 4
E616	Water Reticulation - Sheet 1 of 3
E617	Water Reticulation - Sheet 2 of 3
E618	Water Reticulation - Sheet 3 of 3
E619	Retaining Wall Specific design Plan - Sheet 1 of 2
E620	Retaining Wall Specific design Plan - Sheet 2 of 2
E621	Drainage Zone of Influence Plan - Sheet 1 of 2
E622	Drainage Zone of Influence Plan - Sheet 2 of 2

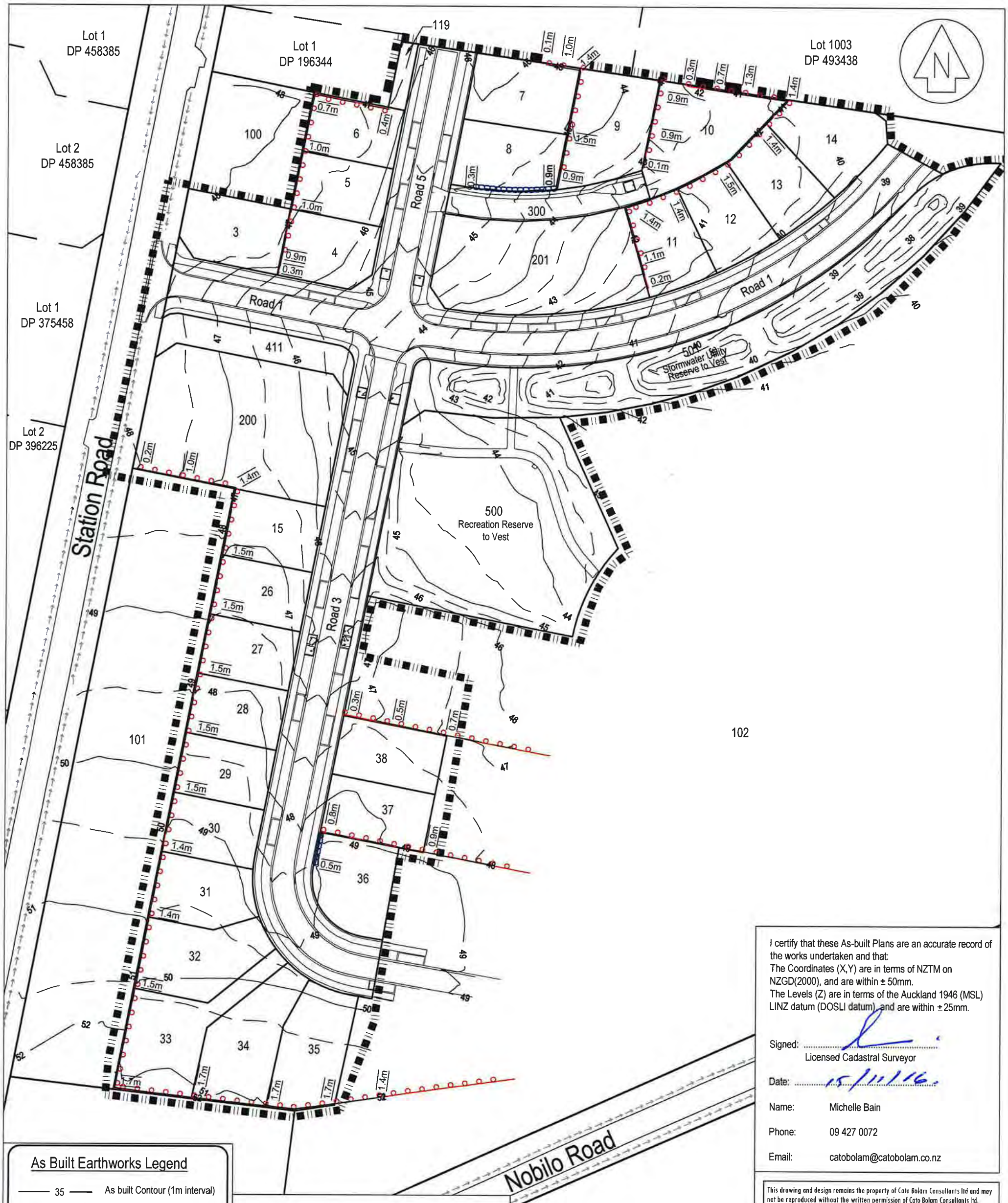
LOCATION DIAGRAM

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

As Built Plans - November 2016



As Built Earthworks Legend

- 35 — As built Contour (1m interval)
- As built Contour (0.5m interval)
- As built Timber Pole Retaining Wall (Poles not shown to scale)
- Concrete Keystone Retaining Wall
- 1.0m — Retaining Wall Height
- Extent of Stage 1A & 3 As Built works

NOTES

1. Contours are finished ground levels as surveyed at 07/11/2016. Contour interval of 0.5m
2. Levels are in terms of LINZ Datum 1946.
3. Coordinates are in terms of NZTM.
4. Retaining wall drain outlets to be connected at house construction stage.
5. All retaining walls over 1.0m high have a pool style fence above the wall.

I certify that these As-built Plans are an accurate record of the works undertaken and that:
The Coordinates (X,Y) are in terms of NZTM on NZGD(2000), and are within ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ± 25mm.

Signed: .....
Licensed Cadastral Surveyor

Date: 15/11/16.

Name: Michelle Bain

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE
	NAME	DATE
SURVEYED	BJ	09/2016
DESIGNED	KM	09/2014
DRAWN	BJ	11/2016
CHECKED	BM	11/2016
APPROVED	TM	11/2016

CLIENT

Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

Final Contour & Retaining Wall
As Built Plan
Sheet 1 of 3

ORIGINAL SCALE 1:1000	ORIGINAL SIZE A3	REVISION NO
DATE 07/11/16	CAD REFERENCE 32522 E600	SHEET NO E600
DIRECTORY Z:\32522\Acad		JOB NO 32522

SLC 67086

I certify that these As-built Plans are an accurate record of the works undertaken and that:
The Coordinates (X,Y) are in terms of NZTM on NZGD(2000), and are within ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum) and are within ±25mm.

Signed: .....
Licensed Cadastral Surveyor

Date: 15/11/16

Name: Michelle Bain

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

Lot 1
DP 196344

Wall drain outlet to be conected to lot 6 private drainage at house construction stage

Wall drain outlet to be connected to lot 14 private drainage at house construction stage

Lot 1003
DP 493438

Wall drain outlet to be connected to lot 9 private drainage at house construction stage

Wall drain outlet to be connected to lot 10 private drainage at house construction stage

Wall drain outlet to be connected to lot 4 private drainage at house construction stage

Wall drain outlet to be connected to lot 200 at house construction stage

Road 1

Road 3

Road 5

Stormwater Utility Reserve to Vest

500
Recreation Reserve to Vest

SLC 67086

NOTES

1. Contours are finished ground levels as surveyed at 07/11/2016. Contour interval of 0.5m
2. Levels are in terms of LINZ Datum 1946.
3. Coordinates are in terms of NZTM.
4. Retaining wall drain outlets to be connected at house construction stage.
5. All retaining walls over 1.0m high have a pool style fence above the wall.

As Built Earthworks Legend

- 35 — As built Contour (1m interval)
- As built Contour (0.5m interval)
- As built Timber Pole Retaining Wall (Poles not shown to scale)
- Concrete Keystone Retaining Wall
- 1.0m — Retaining Wall Height
- Extent of Stage 1A & 3 As Built works

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE

	NAME	DATE
SURVEYED	BJ	09/2016
DESIGNED	KM	09/2014
DRAWN	BJ	11/2016
CHECKED	BM	11/2016
APPROVED	TM	11/2016

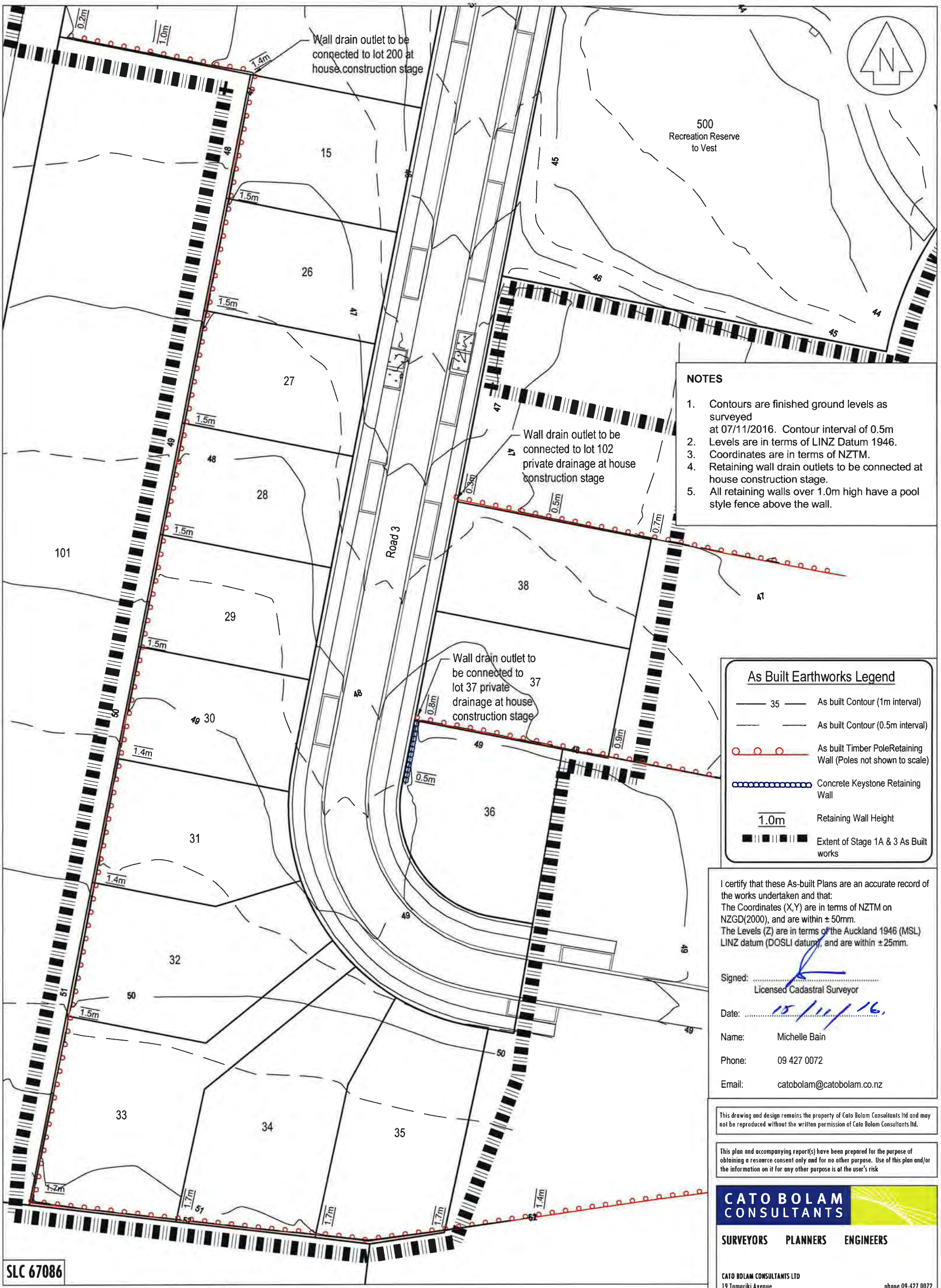
CLIENT

Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

Final Contour & Retaining Wall
As Built Plan
Sheet 2 of 3

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:500	A3	
DATE	CAD REFERENCE	SHEET NO
07/11/16	32522 E600	E601
DIRECTORY		JOB NO
Z:\32522\Acad		32522



NOTES

1. Contours are finished ground levels as surveyed at 07/11/2016. Contour interval of 0.5m
2. Levels are in terms of LINZ Datum 1946.
3. Coordinates are in terms of NZTM.
4. Retaining wall drain outlets to be connected at house construction stage.
5. All retaining walls over 1.0m high have a pool style fence above the wall.

As Built Earthworks Legend

- 35 — As built Contour (1m interval)
- As built Contour (0.5m interval)
- As built Timber PoleRetaining Wall (Poles not shown to scale)
- Concrete Keystone Retaining Wall
- 1.0m — Retaining Wall Height
- Extent of Stage 1A & 3 As Built works

I certify that these As-built Plans are an accurate record of the works undertaken and that:
The Coordinates (X,Y) are in terms of NZTM on NZGD(2000), and are within ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ±25mm.

Signed: .....
Licensed Cadastral Surveyor

Date: 15/11/16.

Name: Michelle Bain

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

SLC 67086

REVISION (DESCRIPTIONS)	NAME	DATE
	NAME	DATE
SURVEYED	BJ	09/2016
DESIGNED	KM	09/2014
DRAWN	BJ	11/2016
CHECKED	BM	11/2016
APPROVED	TM	11/2016

CLIENT

Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

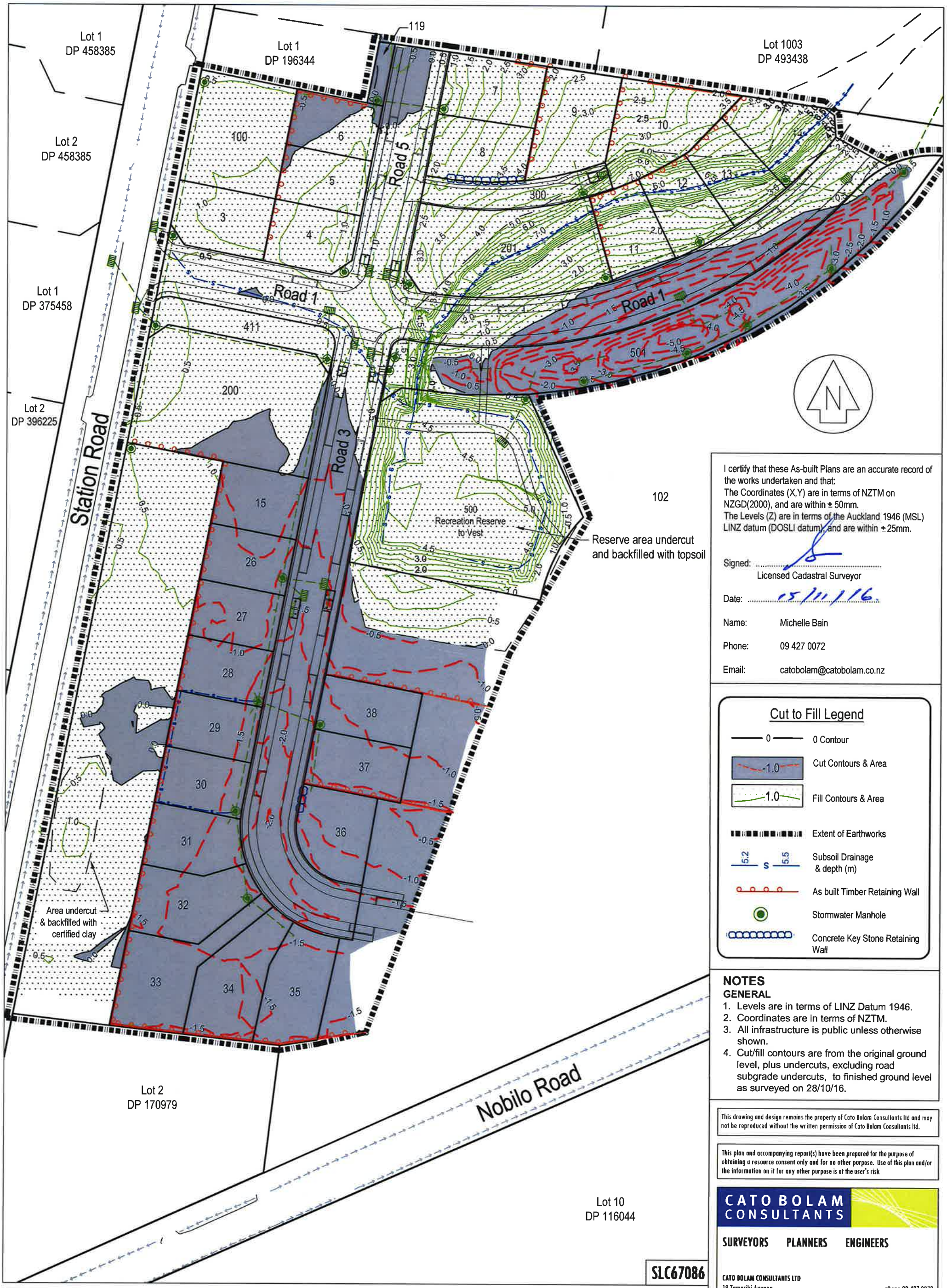
Final Contour & Retaining Wall
As Built Plan
Sheet 3 of 3

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

ORIGINAL SCALE 1:500	ORIGINAL SIZE A3	REVISION NO
DATE 07/11/16	CAD REFERENCE 32522 E600	SHEET NO E602
DIRECTORY Z:\31506\Acad		JOB NO 32522



I certify that these As-built Plans are an accurate record of the works undertaken and that:
The Coordinates (X,Y) are in terms of NZTM on NZGD(2000), and are within ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ± 25mm.

Signed: .....
Licensed Cadastral Surveyor

Date: 05/11/16.

Name: Michelle Bain

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

Cut to Fill Legend

- 0 Contour
- -1.0 Cut Contours & Area
- 1.0 Fill Contours & Area
- Extent of Earthworks
- 5.2 S 5.5 Subsoil Drainage & depth (m)
- As built Timber Retaining Wall
- Stormwater Manhole
- Concrete Key Stone Retaining Wall

NOTES

GENERAL

1. Levels are in terms of LINZ Datum 1946.
2. Coordinates are in terms of NZTM.
3. All infrastructure is public unless otherwise shown.
4. Cut/fill contours are from the original ground level, plus undercuts, excluding road subgrade undercuts, to finished ground level as surveyed on 28/10/16.

SLC67086

REVISION (DESCRIPTIONS)	NAME	DATE
	NAME	DATE
SURVEYED	BJ	09/16
DESIGNED	KM	09/14
DRAWN	BJ	11/16
CHECKED	BM	11/16
APPROVED	TL	11/16

CLIENT

Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

Cut Fill
As Built Plan
Sheet 1 of 3

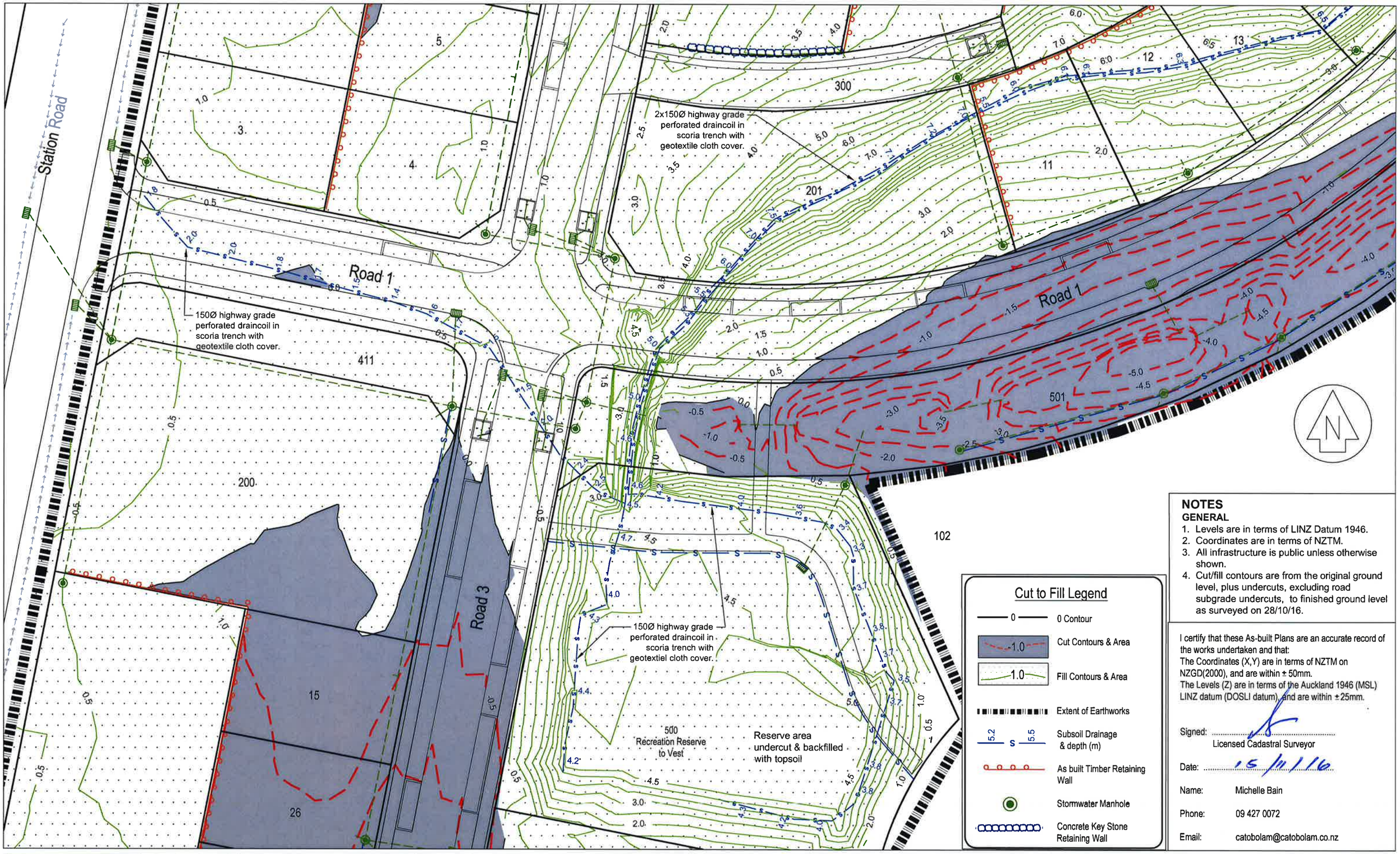
CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946

phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

ORIGINAL SCALE 1:1000	ORIGINAL SIZE A3	REVISION NO
DATE 03/11/16	CAD REFERENCE 32522 E603	SHEET NO E603
DIRECTORY Z:\32522\Acad		JOB NO 32522



Cut to Fill Legend

- 0 Contour
- Cut Contours & Area
- Fill Contours & Area
- Extent of Earthworks
- Subsoil Drainage & depth (m)
- As built Timber Retaining Wall
- Stormwater Manhole
- Concrete Key Stone Retaining Wall

NOTES

GENERAL

1. Levels are in terms of LINZ Datum 1946.
2. Coordinates are in terms of NZTM.
3. All infrastructure is public unless otherwise shown.
4. Cut/fill contours are from the original ground level, plus undercuts, excluding road subgrade undercuts, to finished ground level as surveyed on 28/10/16.

I certify that these As-built Plans are an accurate record of the works undertaken and that:
The Coordinates (X,Y) are in terms of NZTM on NZGD(2000), and are within ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ±25mm.

Signed: .....
Licensed Cadastral Surveyor

Date: 15/11/16

Name: Michelle Bain

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE

	NAME	DATE
SURVEYED	BJ	09/16
DESIGNED	KM	09/14
DRAWN	BJ	11/16
CHECKED	BM	11/16
APPROVED	TL	11/16

This plan and accompanying report(s) have been prepared for the purpose of obtaining a resource consent only and for no other purpose. Use of this plan and/or the information on it for any other purpose is at the user's risk

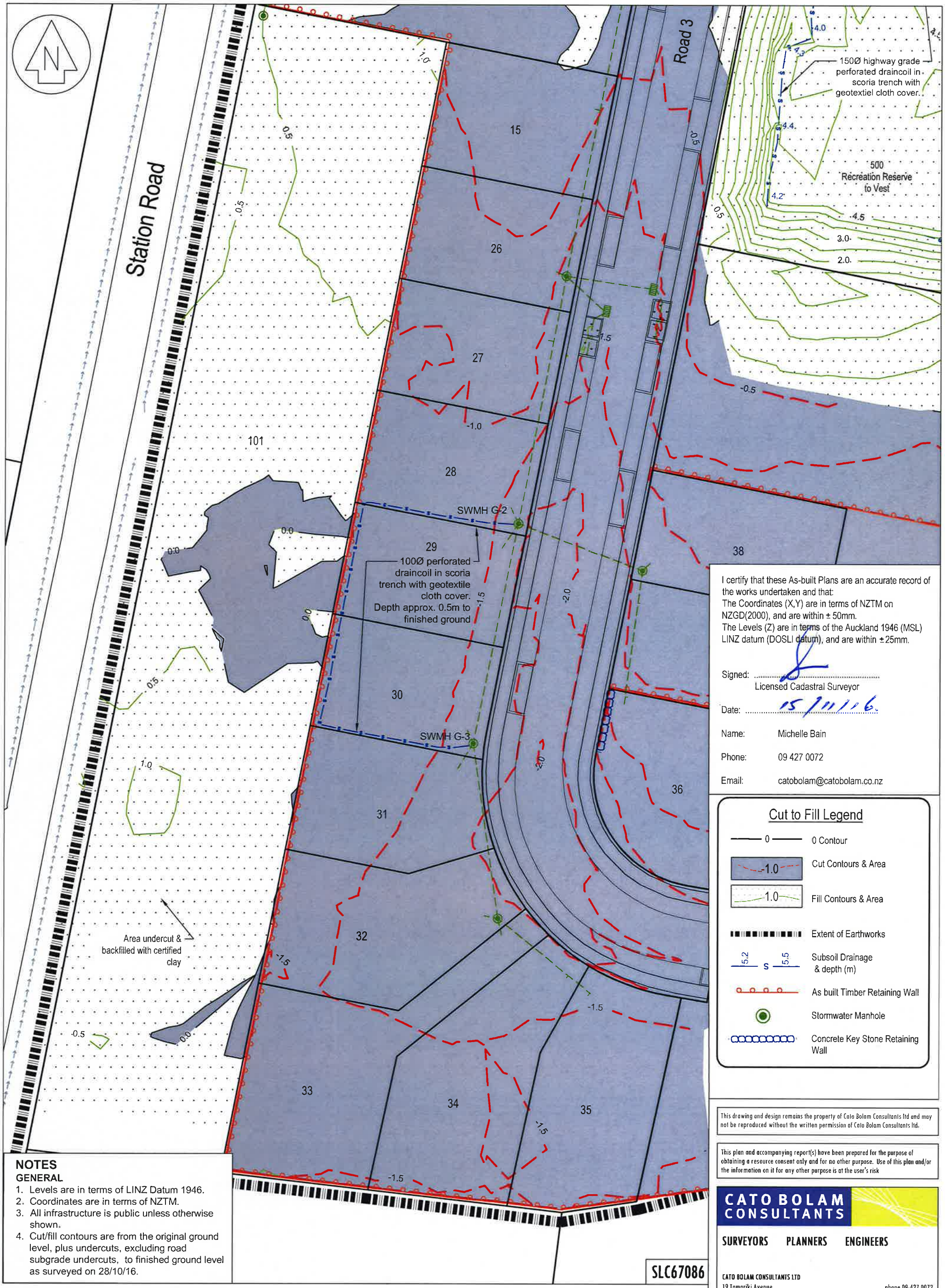
CLIENT

Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

Cut Fill
As Built Plan
Sheet 2 of 3

ORIGINAL SCALE 1:500	ORIGINAL SIZE A3	REVISION NO
DATE 03/11/16	CAD REFERENCE 32522 E603	SHEET NO E604
DIRECTORY Z:\32522\Acad	IMAGE FILE	JOB NO 32522



I certify that these As-built Plans are an accurate record of the works undertaken and that:
The Coordinates (X,Y) are in terms of NZTM on NZGD(2000), and are within ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ±25mm.

Signed: .....
Licensed Cadastral Surveyor

Date: 05/11/16.

Name: Michelle Bain

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

Cut to Fill Legend

- 0 Contour
- -1.0 Cut Contours & Area
- 1.0 Fill Contours & Area
- Extent of Earthworks
- 5.2 S 5.5 Subsoil Drainage & depth (m)
- As built Timber Retaining Wall
- Stormwater Manhole
- Concrete Key Stone Retaining Wall

NOTES

GENERAL

1. Levels are in terms of LINZ Datum 1946.
2. Coordinates are in terms of NZTM.
3. All infrastructure is public unless otherwise shown.
4. Cut/fill contours are from the original ground level, plus undercuts, excluding road subgrade undercuts, to finished ground level as surveyed on 28/10/16.

SLC67086

REVISION (DESCRIPTIONS)	NAME	DATE
	NAME	DATE
SURVEYED	BJ	09/16
DESIGNED	KM	09/14
DRAWN	BJ	11/16
CHECKED	BM	11/16
APPROVED	TL	11/16

CLIENT

Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

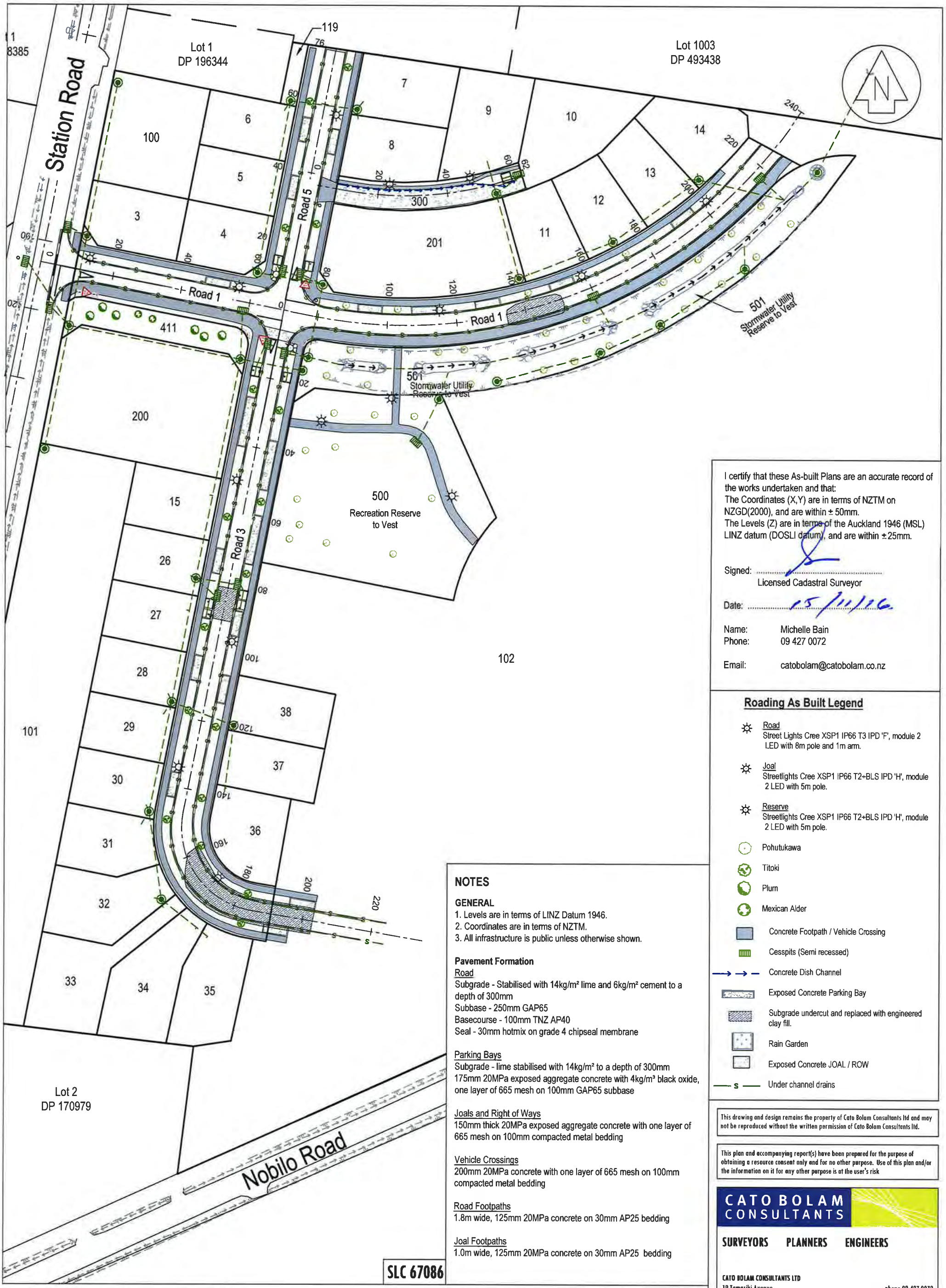
Cut Fill
As Built Plan
Sheet 3 of 3

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

ORIGINAL SCALE 1:500	ORIGINAL SIZE A3	REVISION NO
DATE 03/11/16	CAD REFERENCE 32522 E603	SHEET NO E605
DIRECTORY Z:\32522\Acad		JOB NO 32522



I certify that these As-built Plans are an accurate record of the works undertaken and that:
The Coordinates (X,Y) are in terms of NZTM on NZGD(2000), and are within ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ± 25mm.

Signed: .....
Licensed Cadastral Surveyor

Date: 15/11/16

Name: Michelle Bain
Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

Roading As Built Legend

- Road — Street Lights Cree XSP1 IP66 T3 IPD 'F', module 2 LED with 8m pole and 1m arm.
- Joal — Streetlights Cree XSP1 IP66 T2+BLS IPD 'H', module 2 LED with 5m pole.
- Reserve — Streetlights Cree XSP1 IP66 T2+BLS IPD 'H', module 2 LED with 5m pole.
- Pohutukawa
- Titoki
- Plum
- Mexican Alder
- Concrete Footpath / Vehicle Crossing
- Cesspits (Semi recessed)
- Concrete Dish Channel
- Exposed Concrete Parking Bay
- Subgrade undercut and replaced with engineered clay fill.
- Rain Garden
- Exposed Concrete JOAL / ROW
- s — Under channel drains

NOTES

GENERAL
1. Levels are in terms of LINZ Datum 1946.
2. Coordinates are in terms of NZTM.
3. All infrastructure is public unless otherwise shown.

Pavement Formation

Road
Subgrade - Stabilised with 14kg/m² lime and 6kg/m² cement to a depth of 300mm
Subbase - 250mm GAP65
Basecourse - 100mm TNZ AP40
Seal - 30mm hotmix on grade 4 chipseal membrane

Parking Bays
Subgrade - lime stabilised with 14kg/m² to a depth of 300mm
175mm 20MPa exposed aggregate concrete with 4kg/m³ black oxide, one layer of 665 mesh on 100mm GAP65 subbase

Joals and Right of Ways
150mm thick 20MPa exposed aggregate concrete with one layer of 665 mesh on 100mm compacted metal bedding

Vehicle Crossings
200mm 20MPa concrete with one layer of 665 mesh on 100mm compacted metal bedding

Road Footpaths
1.8m wide, 125mm 20MPa concrete on 30mm AP25 bedding

Joal Footpaths
1.0m wide, 125mm 20MPa concrete on 30mm AP25 bedding

CATO BOLAM CONSULTANTS
SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE

	NAME	DATE
SURVEYED	BJ	09/2016
DESIGNED	KM	10/2014
DRAWN	BJ	11/2016
CHECKED	BM	11/2016
APPROVED	TL	11/2016

CLIENT
Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE
Road
As Built Plan
Sheet 1 of 3

ORIGINAL SCALE 1:1000	ORIGINAL SIZE A3	REVISION NO
DATE 03/11/2016	CAD REFERENCE 32522 E606	SHEET NO E606
DIRECTORY Z:\32522\Acad		JOB NO 32522

I certify that these As-built Plans are an accurate record of the works undertaken and that:
The Coordinates (X,Y) are in terms of NZTM on NZGD(2000), and are within ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ± 25mm.

Signed: .....
Licensed Cadastral Surveyor

Date: 05/11/16

Name: Michelle Bain
Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

Lot 1
DP 196344

Lot 1003
DP 493438

Road 5

Road 1

Road 3

Mountable Kerb & Channel

Vertical Kerb & Channel

7m long recessed parking bay

Road name

125mm 20MPa Concrete footpath on 30mm AP25 bedding

concrete drive

1m wide concrete footpath

Private rain garden

900mm deep undercut backfilled with engineered clay fill

Give way sign

3m wide pedestrian / cycle shared path

Giveway sign
Pedestrian/ cycle way signs

Pedestrian/ Cycle way sign

3m wide pedestrian / cycle crossing with 200mm 20MPa exposed concrete inset with 2 layers of 665 mesh on compacted road subbase, with 4kg/m³ black oxide

14m long recessed parking bay

2m wide concrete footpath

2.4m wide concrete footpath

Plane tree

501
Stormwater Utility
Reserve to Vest

500
Recreation Reserve
to Vest

100 200 201 300 411 102

3 4 5 6 7 8 9 10 11 12 13 14

119

SLC 67086

Refer to E606 for notes

Roading As Built Legend

- Road — Street Lights Cree XSP1 IP66 T3 IPD 'F', module 2 LED with 8m pole and 1m arm.
- Joal — Streetlights Cree XSP1 IP66 T2+BLS IPD 'H', module 2 LED with 5m pole.
- Reserve — Streetlights Cree XSP1 IP66 T2+BLS IPD 'H', module 2 LED with 5m pole.
- Pohutukawa
- Titoki
- Plum
- Mexican Alder
- Concrete Footpath
- Cesspits (Semi recessed)
- Concrete Dish Channel
- Exposed Concrete Parking Bay
- Subgrade undercut and replaced with engineered clay fill.
- Rain Garden
- Exposed Concrete JOAL, ROW & Vehicle Crossing
- s — Under channel drains

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE

	NAME	DATE
SURVEYED	BJ	09/16
DESIGNED	KM	09/14
DRAWN	BJ	11/16
CHECKED	BM	11/16
APPROVED	TL	11/16

This plan and accompanying report(s) have been prepared for the purpose of obtaining a resource consent only and for no other purpose. Use of this plan and/or the information on it for any other purpose is at the user's risk

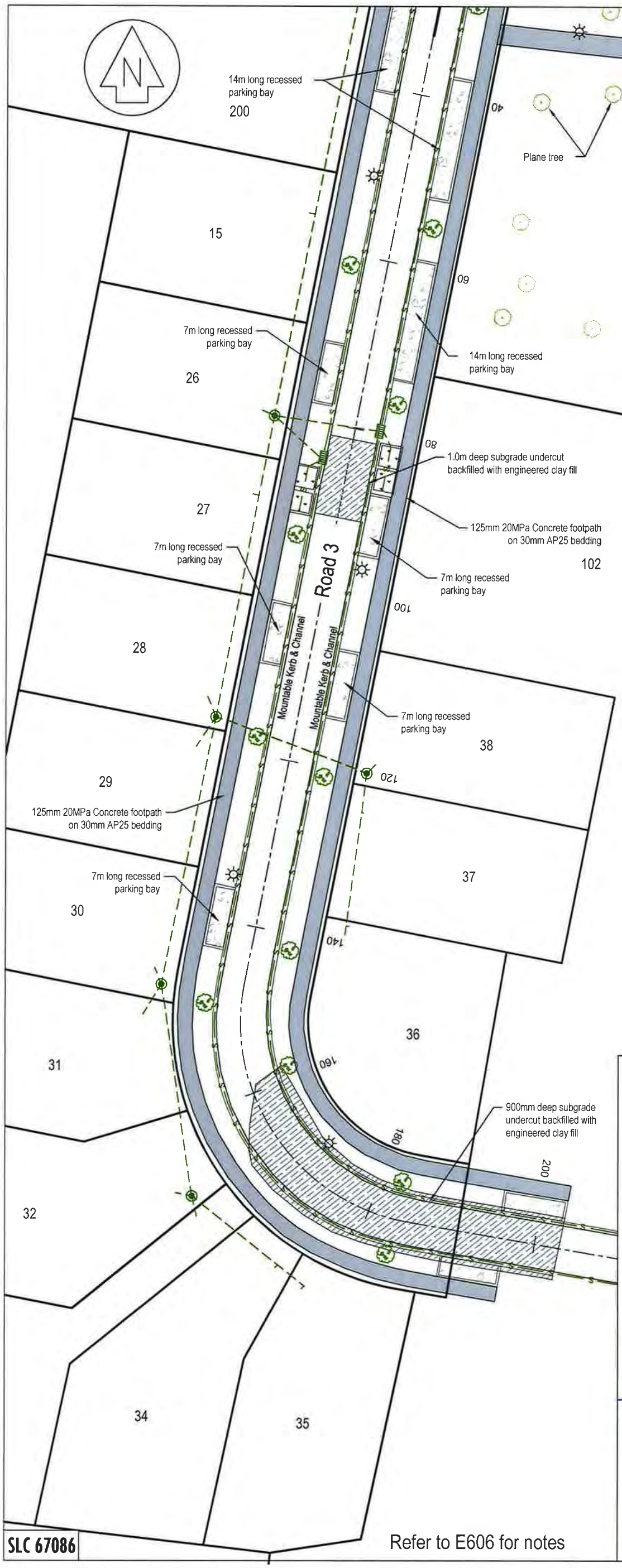
CLIENT

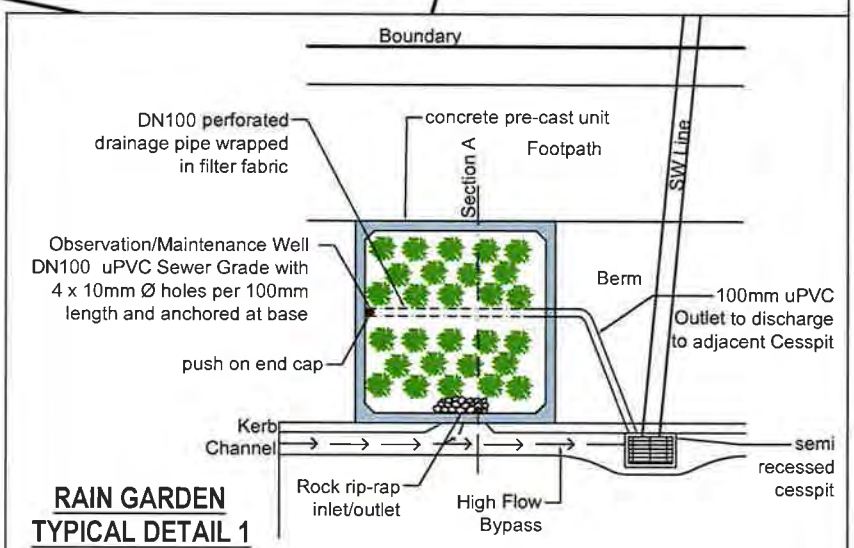
Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

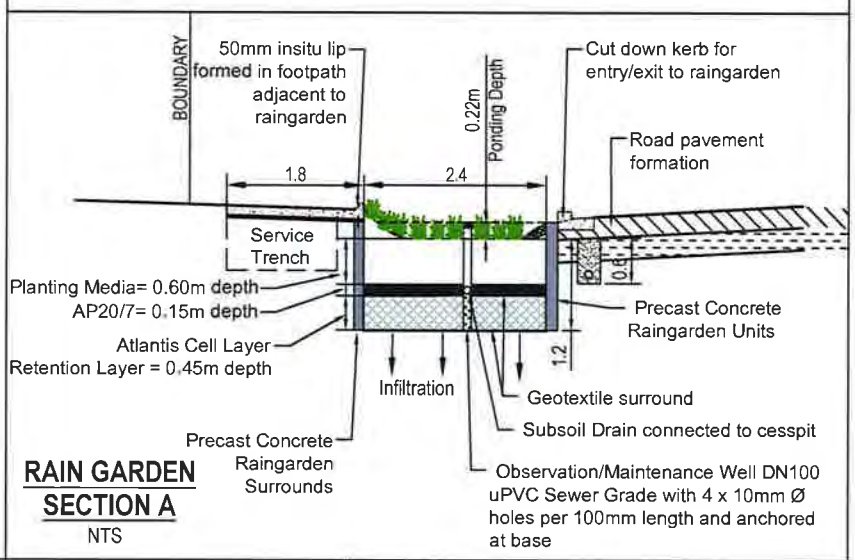
Road
As Built Plan
Sheet 2 of 3

ORIGINAL SCALE 1:500	ORIGINAL SIZE A3	REVISION NO
DATE 03/11/16	CAD REFERENCE 32522 E606	SHEET NO E607
DIRECTORY Z:\32522\Acad	IMAGE FILE	JOB NO 32522





RAIN GARDEN TYPICAL DETAIL 1
NTS



RAIN GARDEN SECTION A
NTS

Roading As Built Legend

- Road — Street Lights Cree XSP1 IP66 T3 IPD 'F', module 2 LED with 8m pole and 1m arm.
- Joal — Streetlights Cree XSP1 IP66 T2+BLS IPD 'H', module 2 LED with 5m pole.
- Reserve — Streetlights Cree XSP1 IP66 T2+BLS IPD 'H', module 2 LED with 5m pole.
- Pohutukawa
- Titoki
- Plum
- Mexican Alder
- Concrete Footpath / Vehicle Crossing
- Cesspits (Semi recessed)
- Concrete Dish Channel
- Exposed Concrete Parking Bay
- Subgrade undercut and replaced with engineered clay fill.
- Rain Garden
- Exposed Concrete JOAL / ROW
- S — Under channel drains

I certify that these As-built Plans are an accurate record of the works undertaken and that:
The Coordinates (X,Y) are in terms of NZTM on NZGD(2000), and are within ±50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ±25mm.

Signed: .....
Licensed Cadastral Surveyor

Date: 15/11/16

Name: Michelle Bain
Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

CATO BOLAM CONSULTANTS
SURVEYORS PLANNERS ENGINEERS

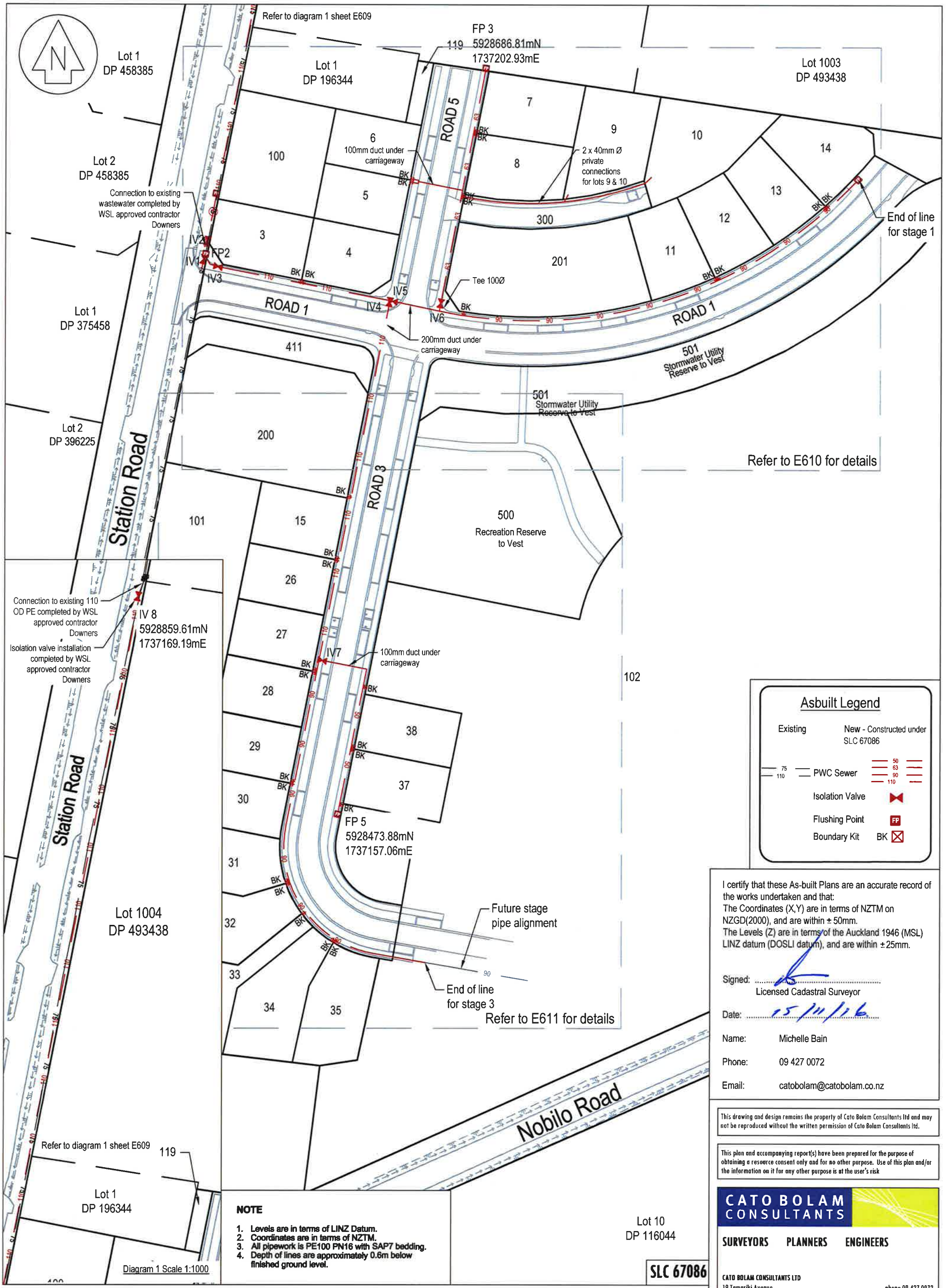
CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE
	NAME	DATE
SURVEYED	BJ	09/2016
DESIGNED	KM	10/2014
DRAWN	BJ	11/2016
CHECKED	BM	11/2016
APPROVED	TL	11/2016

CLIENT
Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE
Road
As Built Plan
Sheet 3 of 3

ORIGINAL SCALE 1:500	ORIGINAL SIZE A3	REVISION NO
DATE 03/11/2016	CAD REFERENCE 32522 E606	SHEET NO E608
DIRECTORY Z:\32522\Acad		JOB NO 32522



Asbuilt Legend

Existing	New - Constructed under SLC 67086
PWC Sewer (75, 110)	PWC Sewer (50, 63, 90, 110)
Isolation Valve	
Flushing Point	FP
Boundary Kit	BK

NOTE

1. Levels are in terms of LINZ Datum.
2. Coordinates are in terms of NZTM.
3. All pipework is PE100 PN16 with SAP7 bedding.
4. Depth of lines are approximately 0.6m below finished ground level.

SLC 67086

I certify that these As-built Plans are an accurate record of the works undertaken and that:
The Coordinates (X,Y) are in terms of NZTM on NZGD(2000), and are within ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ± 25mm.

Signed: .....
Licensed Cadastral Surveyor

Date: 15/11/16

Name: Michelle Bain

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE
	NAME	DATE
SURVEYED	BJ	09/16
DESIGNED	KM	09/14
DRAWN	BJ	11/16
CHECKED	BM	11/16
APPROVED	TL	11/16

CLIENT

Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

Wastewater Reticulation
As Built Plan
Sheet 1 of 3

ORIGINAL SCALE 1:1000	ORIGINAL SIZE A3	REVISION NO
DATE 03/11/16	CAD REFERENCE 32522 E609	SHEET NO E609
DIRECTORY Z:\32522\Acad		JOB NO 32522

Station Road

Road 5

Road 1

Road 3

Lot 1
DP 196344

Lot 1004
DP 493438

Lot 1003
DP 493438

FP 3
5928686.81mN
1737202.93mE

14
FP 4
5928653.34mN
1737309.06mE

Refer to diagram 3 E610

FP 1 (110Ø)
5928652.24mN
1737125.31mE

100mm duct under carriageway

2 x 40mm Ø private connections for lots 9 & 10

Combination Air & Vacuum Release Valve
Vent O Mat Model RGX (PN16)
5928647.09mN
1737124.09mE

Refer to diagram 1 E610

Refer to diagram 2 E610

200mm duct under carriageway

IV1
IV2
IV3
IV4
IV5
IV6
FP2

100
119
6
5
4
3
7
8
9
10
11
12
13
300
201
411
200

Asbuilt Legend

Existing

New - Constructed under SLC 67086

PWC Sewer — 50, 63, 90, 110

Isolation Valve

Flushing Point FP

Boundary Kit BK

I certify that these As-built Plans are an accurate record of the works undertaken and that:
The Coordinates (X,Y) are in terms of NZTM on NZGD(2000), and are within ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ± 25mm.

Signed: .....
Licensed Cadastral Surveyor

Date: 15/11/16

Name: Michelle Bain

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

Diagram 1 Scale 1:250

IV 1 (75Ø)
5928633.62mN
1737121.16mE

IV 2 (110Ø)
5928638.78mN
1737122.29mE

FP 2 (75Ø)
5928635.12mN
1737121.81mE

IV 3
5928631.48mN
1737125.25mE

Diagram 2 Scale 1:250

IV 5
5928620.74mN
1737175.20mE

IV 6
5928619.89mN
1737188.91mE

IV 4
5928620.57mN
1737174.25mE

Diagram 3 Scale 1:100

FP 1 (110Ø)
5928652.24mN
1737125.31mE

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE

	NAME	DATE
SURVEYED	BJ	09/16
DESIGNED	KM	09/14
DRAWN	BJ	11/16
CHECKED	BM	11/16
APPROVED	TL	11/16

This plan and accompanying report(s) have been prepared for the purpose of obtaining a resource consent only and for no other purpose. Use of this plan and/or the information on it for any other purpose is at the user's risk

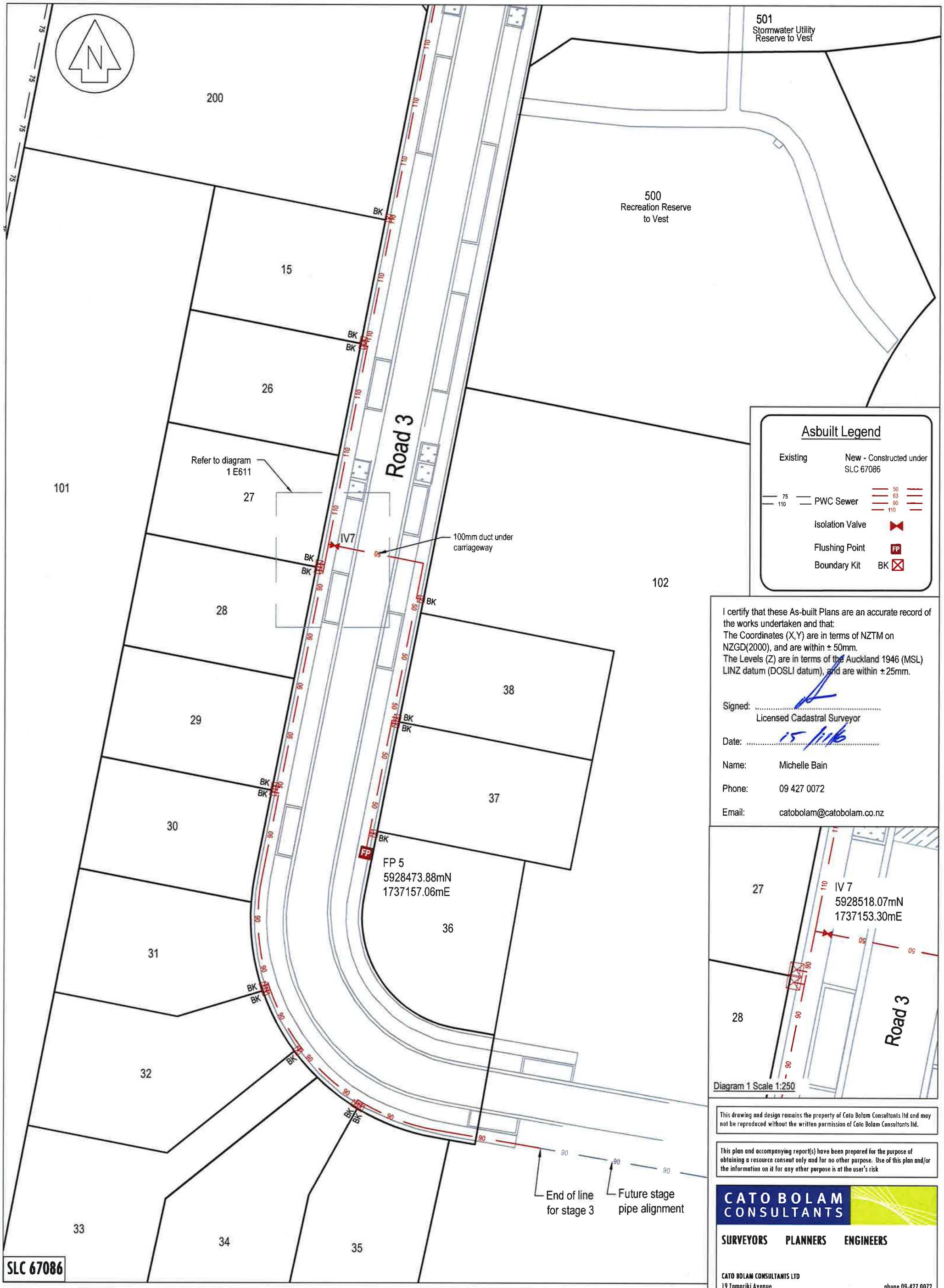
CLIENT

Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

Wastewater Reticulation
As Built Plan
Sheet 2 of 3

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:500	A3	
DATE	CAD REFERENCE	SHEET NO
03/11/16	32522 E609	E610
DIRECTORY	IMAGE FILE	JOB NO
Z:\32522\Acad		32522



Asbuilt Legend

Existing

New - Constructed under SLC 67086

75 / 110 PWC Sewer — 50, 63, 90, 110

Isolation Valve

Flushing Point FP

Boundary Kit BK

I certify that these As-built Plans are an accurate record of the works undertaken and that:
The Coordinates (X,Y) are in terms of NZTM on NZGD(2000), and are within ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ± 25mm.

Signed: .....
Licensed Cadastral Surveyor

Date: 15 July 16

Name: Michelle Bain

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

Diagram 1 Scale 1:250

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE
	NAME	DATE
SURVEYED	BJ	09/16
DESIGNED	KM	09/14
DRAWN	BJ	11/16
CHECKED	BM	11/16
APPROVED	TL	11/16

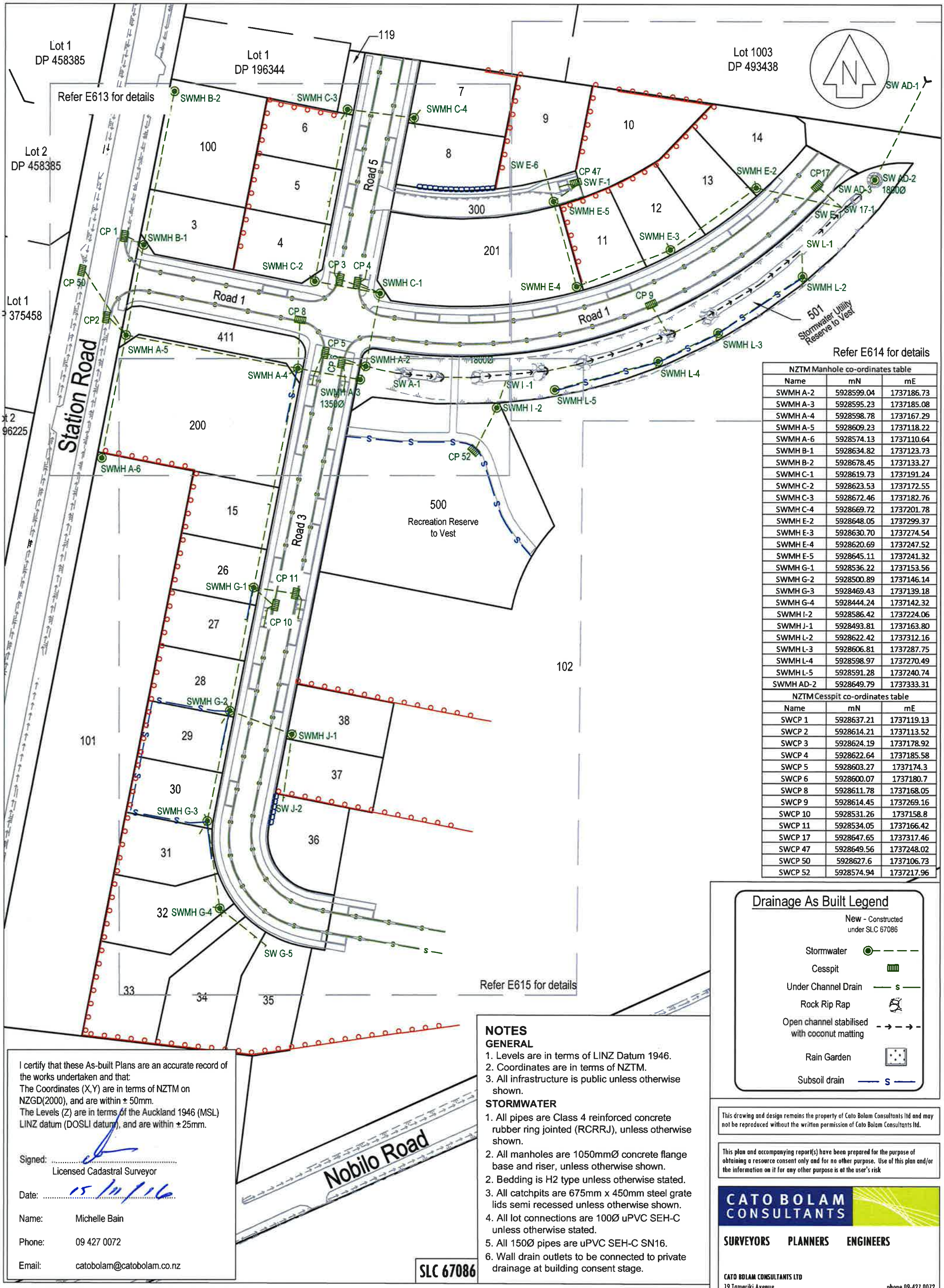
CLIENT

Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

Wastewater Reticulation
As Built Plan
Sheet 3 of 3

ORIGINAL SCALE 1:500	ORIGINAL SIZE A3	REVISION NO
DATE 03/11/16	CAD REFERENCE 32522 E609	SHEET NO E611
DIRECTORY Z:\32522\Acad		JOB NO 32522



NZTM Manhole co-ordinates table		
Name	mN	mE
SWMH A-2	5928599.04	1737186.73
SWMH A-3	5928595.23	1737185.08
SWMH A-4	5928598.78	1737167.29
SWMH A-5	5928609.23	1737118.22
SWMH A-6	5928574.13	1737110.64
SWMH B-1	5928634.82	1737123.73
SWMH B-2	5928678.45	1737133.27
SWMH C-1	5928619.73	1737191.24
SWMH C-2	5928623.53	1737172.55
SWMH C-3	5928672.46	1737182.76
SWMH C-4	5928669.72	1737201.78
SWMH E-2	5928648.05	1737299.37
SWMH E-3	5928630.70	1737274.54
SWMH E-4	5928620.69	1737247.52
SWMH E-5	5928645.11	1737241.32
SWMH G-1	5928536.22	1737153.56
SWMH G-2	5928500.89	1737146.14
SWMH G-3	5928469.43	1737139.18
SWMH G-4	5928444.24	1737142.32
SWMH I-2	5928586.42	1737224.06
SWMH J-1	5928493.81	1737163.80
SWMH L-2	5928622.42	1737312.16
SWMH L-3	5928606.81	1737287.75
SWMH L-4	5928598.97	1737270.49
SWMH L-5	5928591.28	1737240.74
SWMH AD-2	5928649.79	1737333.31

NZTM Cesspit co-ordinates table		
Name	mN	mE
SWCP 1	5928637.21	1737119.13
SWCP 2	5928614.21	1737113.52
SWCP 3	5928624.19	1737178.92
SWCP 4	5928622.64	1737185.58
SWCP 5	5928603.27	1737174.3
SWCP 6	5928600.07	1737180.7
SWCP 8	5928611.78	1737168.05
SWCP 9	5928614.45	1737269.16
SWCP 10	5928531.26	1737158.8
SWCP 11	5928534.05	1737166.42
SWCP 17	5928647.65	1737317.46
SWCP 47	5928649.56	1737248.02
SWCP 50	5928627.6	1737106.73
SWCP 52	5928574.94	1737217.96

Drainage As Built Legend

New - Constructed under SLC 67086

- Stormwater
- Cesspit
- Under Channel Drain — s —
- Rock Rip Rap
- Open channel stabilised with coconut matting
- Rain Garden
- Subsoil drain — s —

I certify that these As-built Plans are an accurate record of the works undertaken and that:
The Coordinates (X,Y) are in terms of NZTM on NZGD(2000), and are within ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ± 25mm.

Signed: .....
Licensed Cadastral Surveyor

Date: 15/11/16

Name: Michelle Bain

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

SLC 67086

NOTES

GENERAL

1. Levels are in terms of LINZ Datum 1946.
2. Coordinates are in terms of NZTM.
3. All infrastructure is public unless otherwise shown.

STORMWATER

1. All pipes are Class 4 reinforced concrete rubber ring jointed (RCRRJ), unless otherwise shown.
2. All manholes are 1050mmØ concrete flange base and riser, unless otherwise shown.
2. Bedding is H2 type unless otherwise stated.
3. All catchpits are 675mm x 450mm steel grate lids semi recessed unless otherwise shown.
4. All lot connections are 100Ø uPVC SEH-C unless otherwise stated.
5. All 150Ø pipes are uPVC SEH-C SN16.
6. Wall drain outlets to be connected to private drainage at building consent stage.

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE
	NAME	DATE
SURVEYED	BJ	09/16
DESIGNED	KM	09/14
DRAWN	BJ	11/16
CHECKED	BM	11/16
APPROVED	TL	11/16

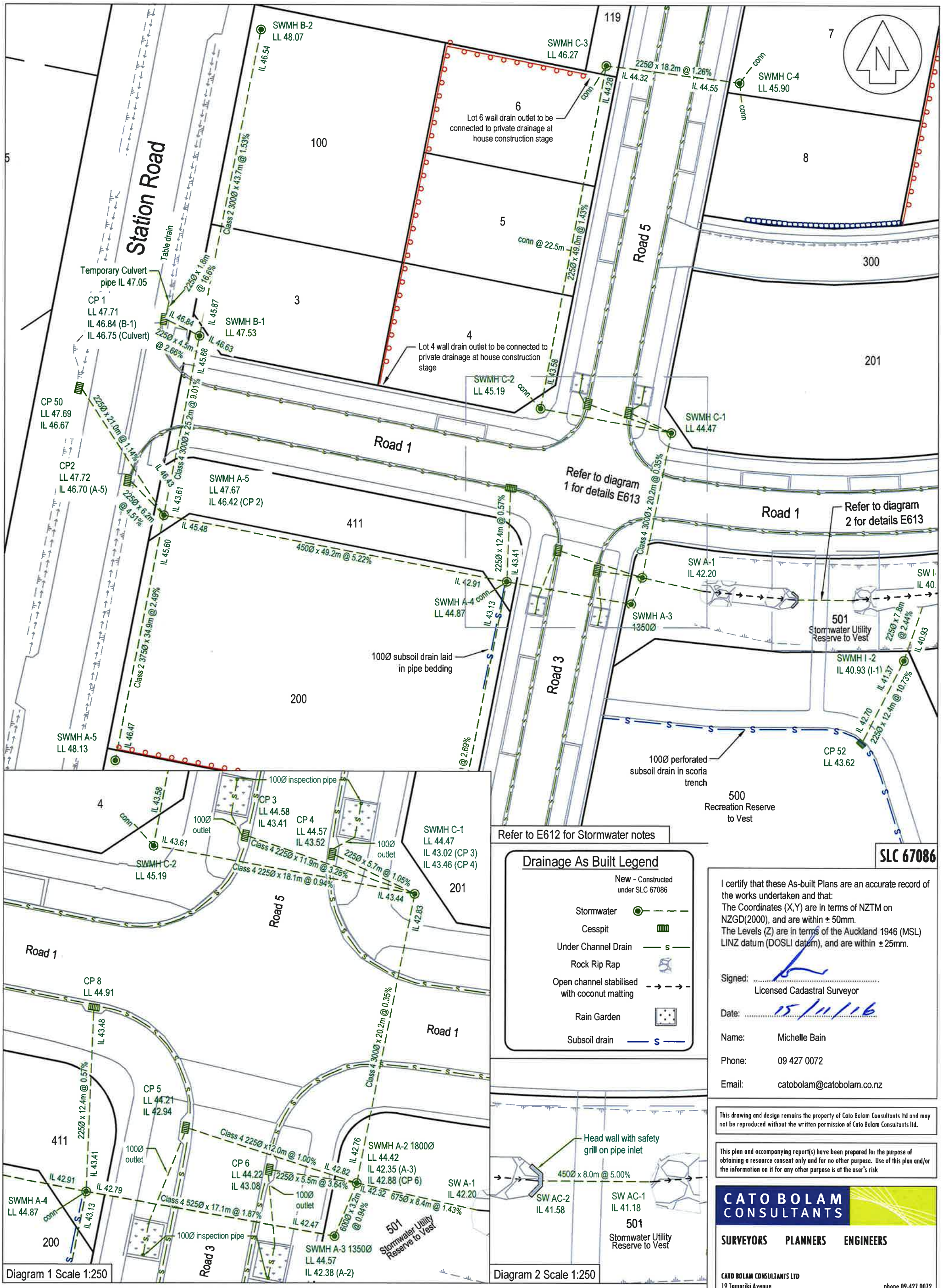
CLIENT

Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

Stormwater Reticulation
As Built Plan
Sheet 1 of 4

ORIGINAL SCALE 1:1000	ORIGINAL SIZE A3	REVISION NO
DATE 03/11/16	CAD REFERENCE 32522 E612	SHEET NO E612
DIRECTORY Z:\32522\Acad		JOB NO 32522



Refer to E612 for Stormwater notes

SLC 67086

Drainage As Built Legend

New - Constructed under SLC 67086

- Stormwater
- Cesspit
- Under Channel Drain — s —
- Rock Rip Rap
- Open channel stabilised with coconut matting
- Rain Garden
- Subsoil drain — s —

I certify that these As-built Plans are an accurate record of the works undertaken and that:
The Coordinates (X,Y) are in terms of NZTM on NZGD(2000), and are within ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ± 25mm.

Signed: .....
Licensed Cadastral Surveyor

Date: 15/11/16

Name: Michelle Bain

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

This plan and accompanying report(s) have been prepared for the purpose of obtaining a resource consent only and for no other purpose. Use of this plan and/or the information on it for any other purpose is at the user's risk

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE

	NAME	DATE
SURVEYED	BJ	09/16
DESIGNED	KM	09/14
DRAWN	BJ	11/16
CHECKED	BM	11/16
APPROVED	TL	11/16

CLIENT

Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

Stormwater Reticulation
As Built Plan
Sheet 2 of 4

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:500	A3	
DATE	CAD REFERENCE	SHEET NO
03/11/16	32522 E612	E613
DIRECTORY		JOB NO
Z:\32522\Acad		32522

Lot 1004
DP 493438

Lot 1003
DP 493438

N

9

10

14

13

12

11

201

501

102

Road 1

Lot 9 wall drain outlet to be connected to private drainage at house construction stage

Lot 10 wall drain outlet to be connected to private drainage at house construction stage

Lot 11 wall drain outlet to be connected to private drainage at house construction stage

Lot 14 wall drain outlet to be connected to private drainage at house construction stage

SW E-6
IL 41.89

150Ø x 9.0m @ 10%

Private CP 47
LL 42.43
IL 41.41

SW F-1

Refer to diagram 4 for details E614

SWMH E-5
LL 42.96
IL 40.85 (CP 47)
IL 40.99 (E6)

IL 40.73

225Ø x 24.2m @ 4.26%

225Ø x 29.3m @ 2.15%

SWMH E-3
LL 40.59
IL 38.61

IL 38.67

225Ø x 27.8m @3.56%

SWMH E-4
LL 41.35
IL 39.70 (E-5)
IL 39.66 (E-3)

conn

SWMH E-2
LL 39.86

IL 37.93

IL 37.98

225Ø X 24.5m @ 1.02%

CP17
IL 38.00

225Ø x 8.5m @ 1.5%

SW AD-3

SW AD-2
1800Ø with low profile scruffy dome

IL 36.53

900Ø x 31.5m @ 0.48%

SW AD-1
IL 36.38

Refer to diagram 3 for details E614

SW E-1
IL 37.68 (E-2)

SW L-1
IL 37.90 (L-2)

SW 17-1
IL 37.87 (CP17)

225Ø x 6.40m @ 1.88%

SWMH L-2
LL 39.12
IL 38.02 (L-1)

IL 38.17

Refer to diagram 2 for details E614

CP 9
LL 39.90
IL 39.00

225Ø x 7.7m @ 1.43%

open channel drain stabilised with coconut matting

SW 9-1
IL 38.89

Refer to diagram 1 for details E614

225Ø x 27.9m @ 0.97%

IL 38.38

IL 38.43

225Ø x 17.9m @ 1.01%

100Ø subsoil drain laid in pipe bedding

SWMH L-3
LL 39.73

Stormwater Utility Reserve to Vest

IL 38.66

IL 38.61

225Ø x 29.7m @ 3.60%

SW I-1
IL 40.74

IL 39.73

SWMH L-4
LL 40.01

225Ø x 7.8m @ 2.44%

IL 40.93

SWMH L-5
LL 41.65

100Ø subsoil drain laid in pipe bedding

Drainage As Built Legend

New - Constructed under SLC 67086

- Stormwater
- Cesspit
- Under Channel Drain — s —
- Rock Rip Rap
- Open channel stabilised with coconut matting
- Rain Garden
- Subsoil drain — s —

Refer to E612 for Stormwater notes

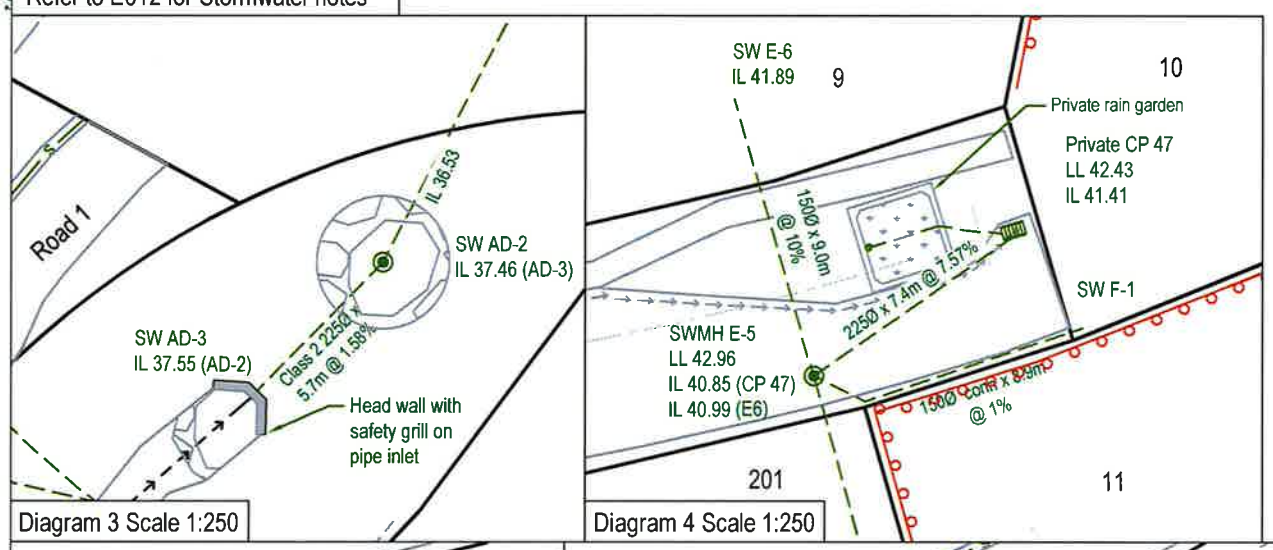


Diagram 3 Scale 1:250

Diagram 4 Scale 1:250

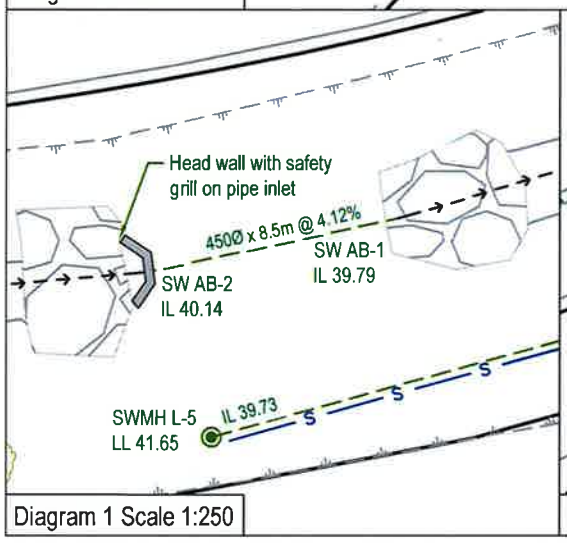


Diagram 1 Scale 1:250

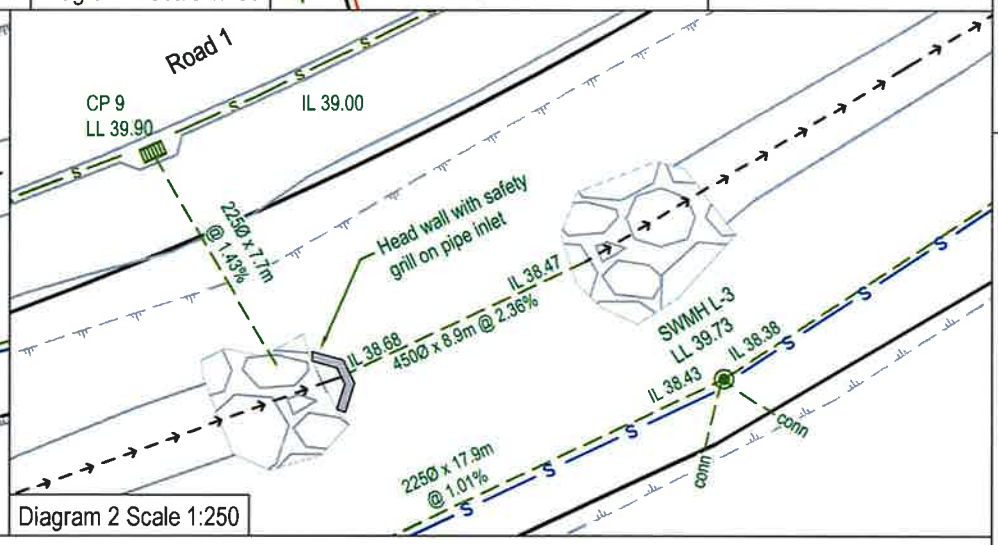


Diagram 2 Scale 1:250

SLC 67086

I certify that these As-built Plans are an accurate record of the works undertaken and that:
The Coordinates (X,Y) are in terms of NZTM on NZGD(2000), and are within ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum) and are within ± 25mm.

Signed: .....
Licensed Cadastral Surveyor

Date: 15/11/16

Name: Michelle Bain

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE
	NAME	DATE
SURVEYED	BJ	09/16
DESIGNED	KM	09/14
DRAWN	BJ	11/16
CHECKED	BM	11/16
APPROVED	TL	11/16

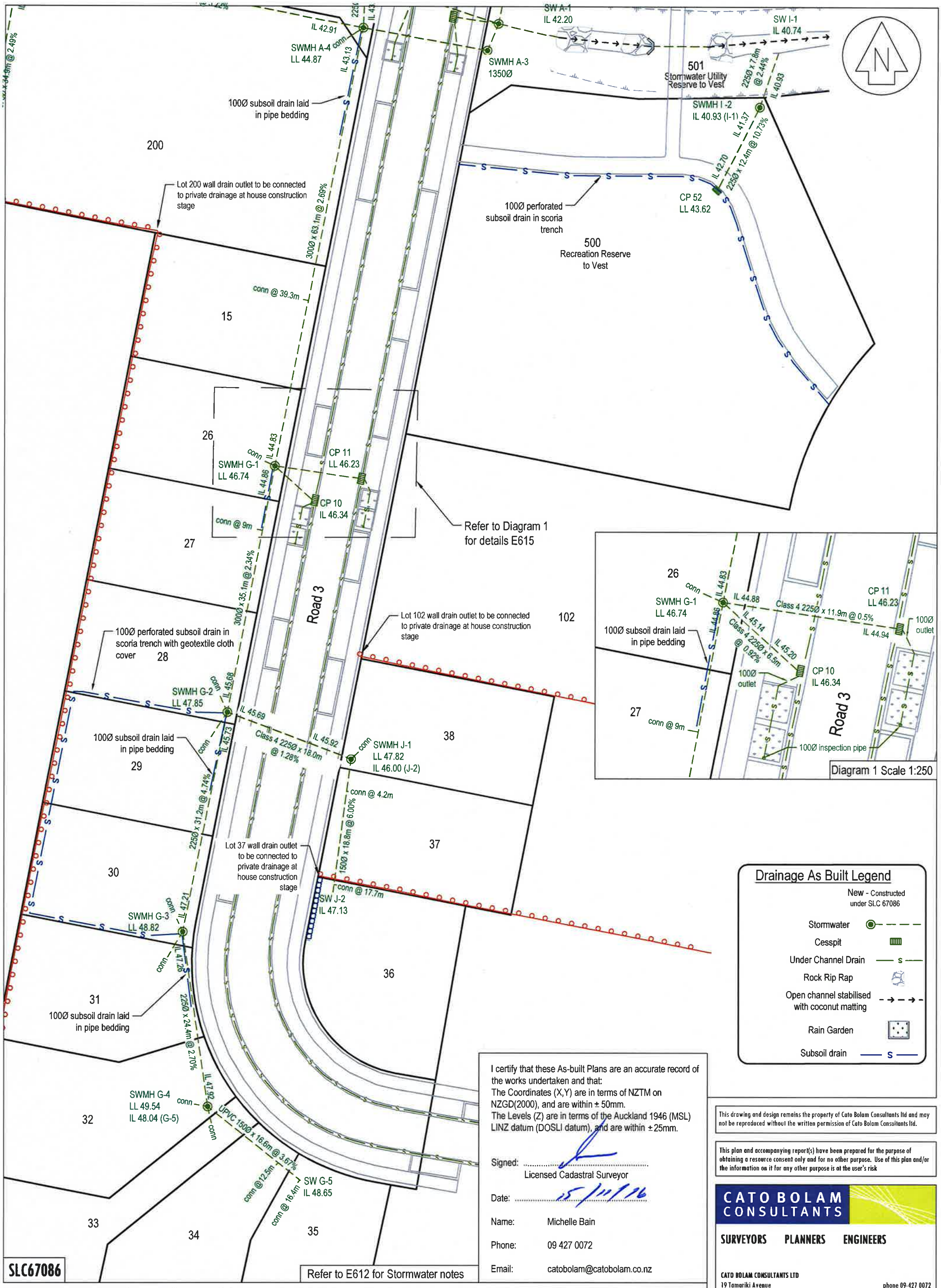
CLIENT

Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

Stormwater Reticulation
As Built Plan
Sheet 3 of 4

ORIGINAL SCALE 1:500	ORIGINAL SIZE A3	REVISION NO
DATE 03/11/16	CAD REFERENCE 32522 E612	SHEET NO E614
DIRECTORY Z:\32522\Acad		JOB NO 32522



I certify that these As-built Plans are an accurate record of the works undertaken and that:
The Coordinates (X,Y) are in terms of NZTM on NZGD(2000), and are within ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ±25mm.

Signed: .....
Licensed Cadastral Surveyor

Date: 25/11/16

Name: Michelle Bain

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE
	NAME	DATE
SURVEYED	BJ	09/16
DESIGNED	KM	09/14
DRAWN	BJ	11/16
CHECKED	BM	11/16
APPROVED	TL	11/16

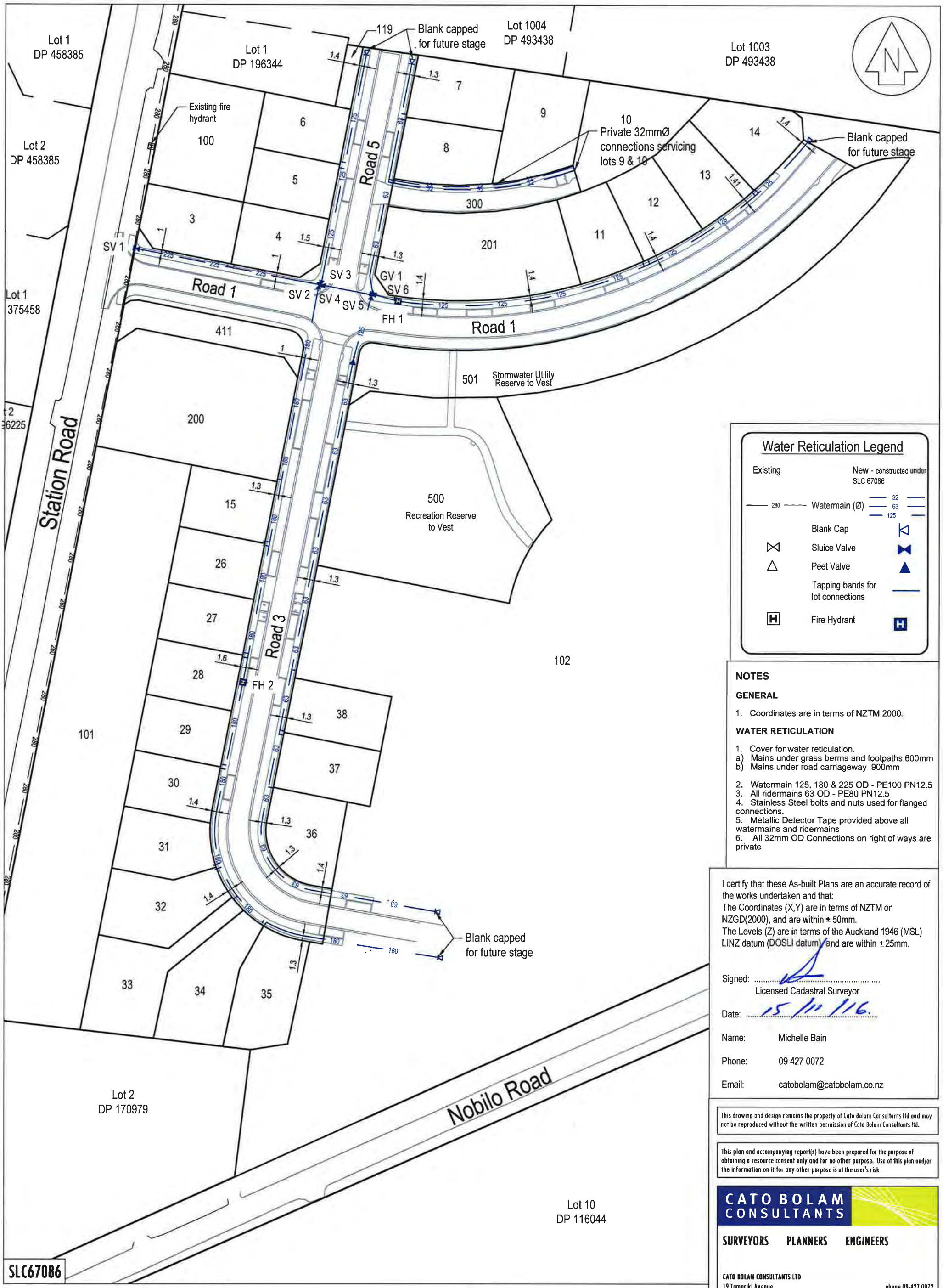
CLIENT

Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

Stormwater Reticulation
As Built Plan
Sheet 4 of 4

ORIGINAL SCALE 1:500	ORIGINAL SIZE A3	REVISION NO
DATE 03/11/16	CAD REFERENCE 32522 E612	SHEET NO E615
DIRECTORY Z:\32522\Acad		JOB NO 32522



Water Reticulation Legend

Existing	New - constructed under SLC 67086
280 Watermain (Ø)	32, 63, 125
Blank Cap	
Sluice Valve	
Peet Valve	
Tapping bands for lot connections	
Fire Hydrant	

NOTES

GENERAL

1. Coordinates are in terms of NZTM 2000.

WATER RETICULATION

1. Cover for water reticulation.
a) Mains under grass berms and footpaths 600mm
b) Mains under road carriageway 900mm

2. Watermain 125, 180 & 225 OD - PE100 PN12.5
3. All ridermains 63 OD - PE80 PN12.5
4. Stainless Steel bolts and nuts used for flanged connections.
5. Metallic Detector Tape provided above all watermains and ridermains
6. All 32mm OD Connections on right of ways are private

I certify that these As-built Plans are an accurate record of the works undertaken and that:
The Coordinates (X,Y) are in terms of NZTM on NZGD(2000), and are within ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum) and are within ± 25mm.

Signed: .....
Licensed Cadastral Surveyor

Date: 15/11/16.

Name: Michelle Bain

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE
	NAME	DATE
SURVEYED	BJ	09/16
DESIGNED	KM	09/14
DRAWN	BJ	11/16
CHECKED	BM	11/16
APPROVED	TL	11/16

CLIENT

Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

Water Reticulation
As Built Plan
Sheet 1 of 3

ORIGINAL SCALE 1:1000	ORIGINAL SIZE A3	REVISION NO
DATE 03/11/16	CAD REFERENCE 32522 E616	SHEET NO E616
DIRECTORY Z:\32522\Acad		JOB NO 32522

Station Road

Road 5

Road 1

Road 3

Existing fire hydrant

2 x Lot connection

Refer to Diagram 1 for details E617

Refer to Diagram 2 for details E617

Refer to Diagram 3 for details E617

2 x lot connections for lot 9 & 10

Private 32mm Ø connections to service lots 9 & 10

Blank capped for future stage

Lot connection

FH 1
5928615.66mN
1737196.97mE

Reducer 100/50

PV 1
5928598.63mN
1737183.68mE

Stormwater Utility Reserve to Vest

SV 1
SV 2
SV 3
SV 4
SV 5
SV 6
GV 1

119
100
6
5
3
4
7
8
9
10
14
13
12
11
300
201
411
501

SLC67086

I certify that these As-built Plans are an accurate record of the works undertaken and that:
The Coordinates (X,Y) are in terms of NZTM on NZGD(2000), and are within ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ±25mm.

Signed: .....
Licensed Cadastral Surveyor

Date: 05/11/16

Name: Michelle Bain

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

Water Reticulation Legend

Existing	New - constructed under SLC 67086
Watermain (Ø) 280	32, 63, 125
Blank Cap	
Sluice Valve	
Peet Valve	
Tapping bands for lot connections	
Fire Hydrant (H)	

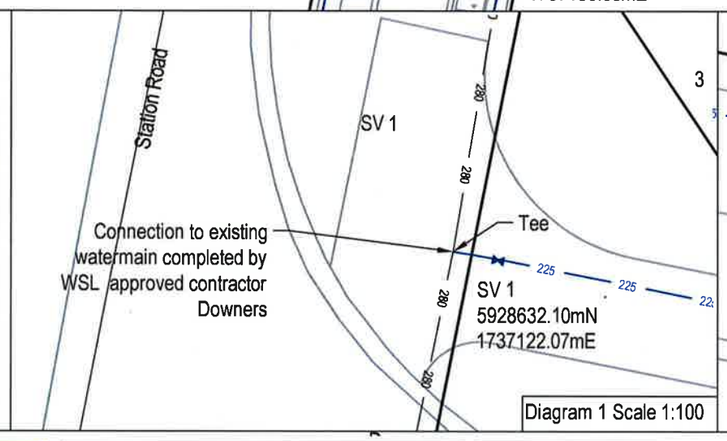


Diagram 1 Scale 1:100

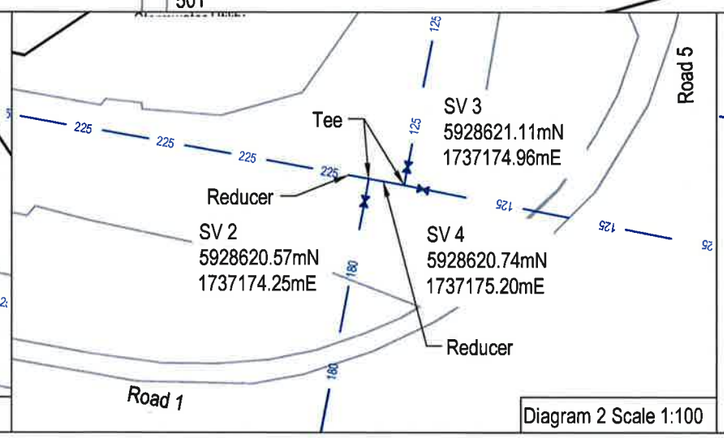


Diagram 2 Scale 1:100

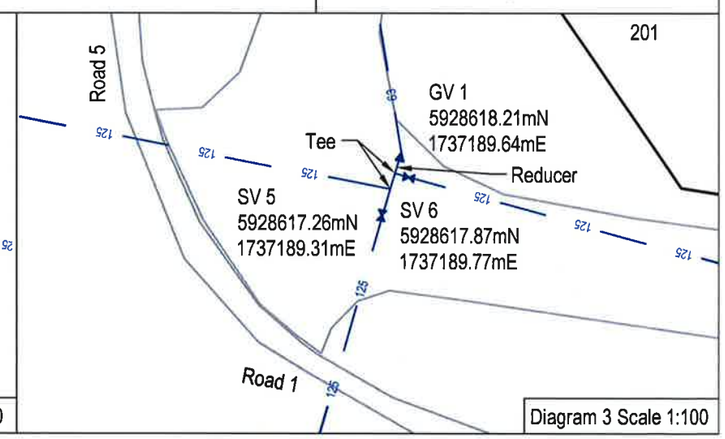


Diagram 3 Scale 1:100

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE

	NAME	DATE
SURVEYED	BJ	09/16
DESIGNED	KM	09/14
DRAWN	BJ	11/16
CHECKED	BM	11/16
APPROVED	TL	11/16

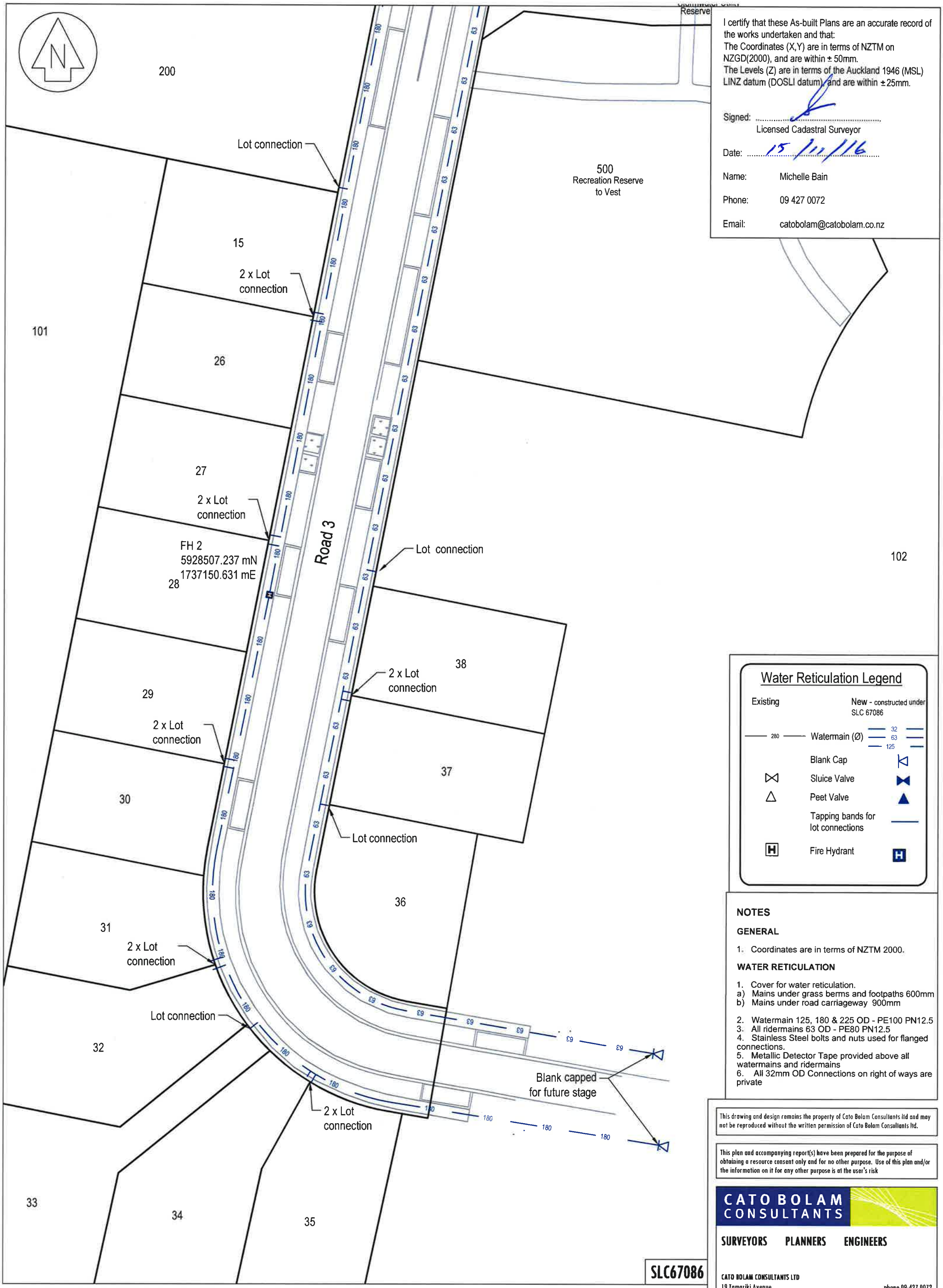
CLIENT

Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

Water Reticulation
As Built Plan
Sheet 2 of 3

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:500	A3	
DATE	CAD REFERENCE	SHEET NO
03/11/16	32522 E616	E617
DIRECTORY		JOB NO
Z:\32522\Acad		32522



I certify that these As-built Plans are an accurate record of the works undertaken and that:
The Coordinates (X,Y) are in terms of NZTM on NZGD(2000), and are within ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ± 25mm.

Signed: .....
Licensed Cadastral Surveyor

Date: 15/11/16

Name: Michelle Bain

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

Water Reticulation Legend

Existing	New - constructed under SLC 67086
280 Watermain (Ø)	32, 63, 125
Blank Cap	
Sluice Valve	
Peet Valve	
Tapping bands for lot connections	
Fire Hydrant (H)	

NOTES

GENERAL

1. Coordinates are in terms of NZTM 2000.

WATER RETICULATION

1. Cover for water reticulation.
a) Mains under grass berms and footpaths 600mm
b) Mains under road carriageway 900mm

2. Watermain 125, 180 & 225 OD - PE100 PN12.5
3. All ridermains 63 OD - PE80 PN12.5
4. Stainless Steel bolts and nuts used for flanged connections.
5. Metallic Detector Tape provided above all watermains and ridermains
6. All 32mm OD Connections on right of ways are private

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE
	NAME	DATE
SURVEYED	BJ	09/16
DESIGNED	KM	09/14
DRAWN	BJ	11/16
CHECKED	BM	11/16
APPROVED	TL	11/16

CLIENT

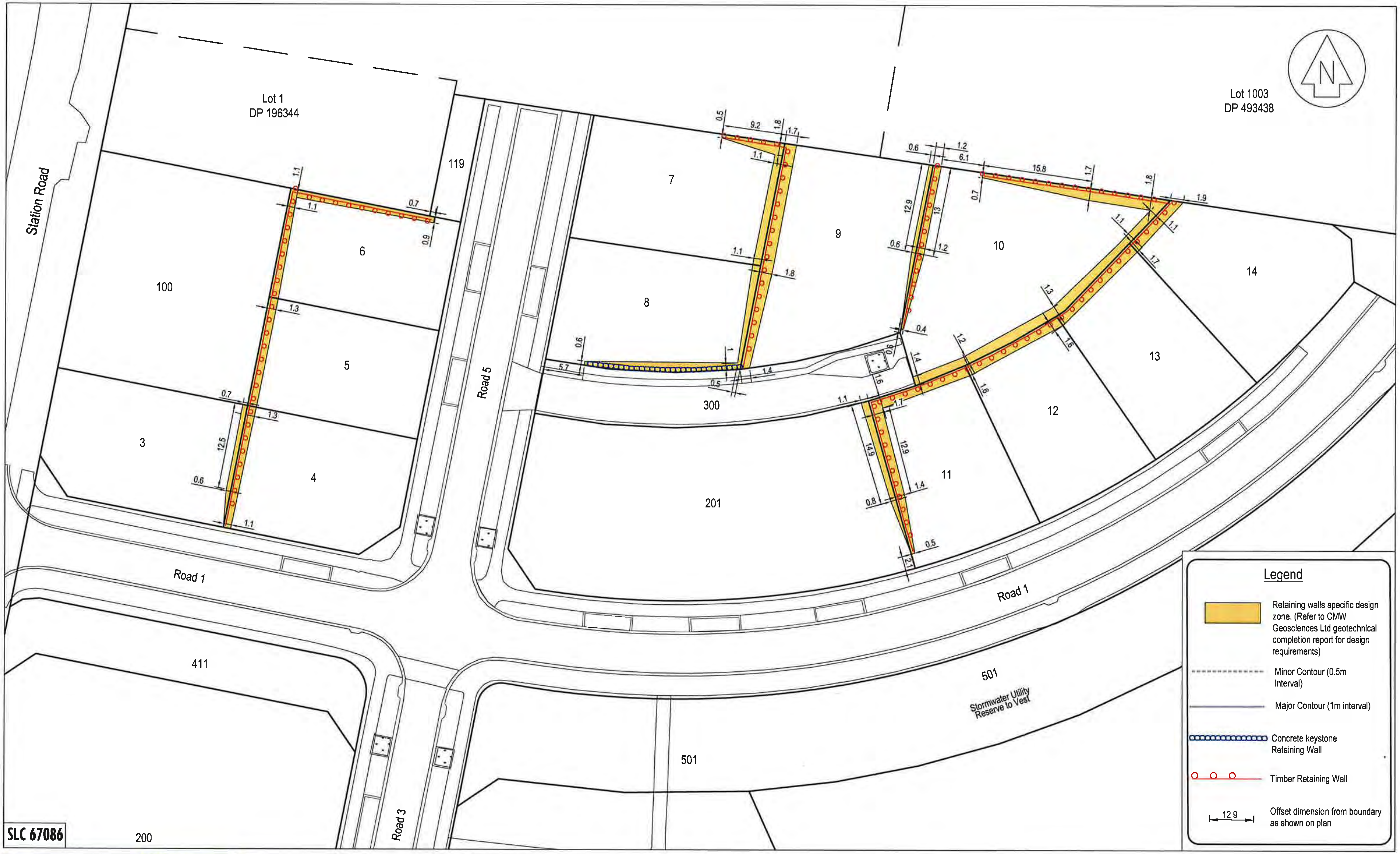
Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

Water Reticulation
As Built Plan
Sheet 3 of 3

SLC67086

ORIGINAL SCALE 1:500	ORIGINAL SIZE A3	REVISION NO
DATE 03/11/16	CAD REFERENCE 32522 E616	SHEET NO E618
DIRECTORY Z:\32522\Acad		JOB NO 32522



CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946

phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE
	NAME	DATE
SURVEYED	BJ	09/2016
DESIGNED	KM	09/2014
DRAWN	BJ	11/2016
CHECKED	BM	11/2016
APPROVED	TM	11/2016

This plan and accompanying report(s) have been prepared for the purpose of obtaining a resource consent only and for no other purpose. Use of this plan and/or the information on it for any other purpose is at the user's risk

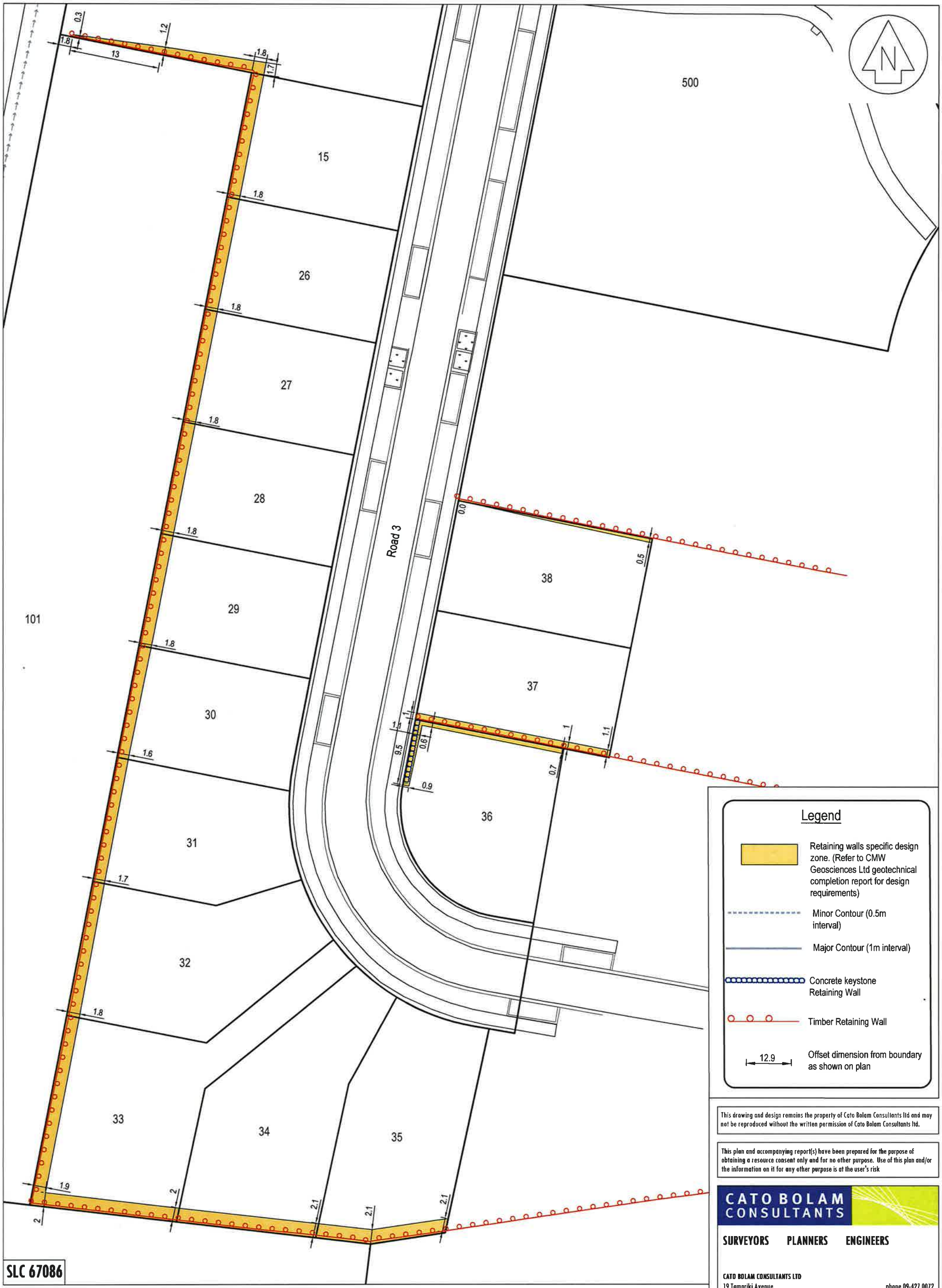
CLIENT

Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

Retaining Wall Specific Design Plan Sheet 1 of 2

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:500	A3	
DATE 07/11/16	CAD REFERENCE 32522 E619	SHEET NO E619
DIRECTORY Z:\32522\Acad		JOB NO 32522



SLC 67086

Legend

- Retaining walls specific design zone. (Refer to CMW Geosciences Ltd geotechnical completion report for design requirements)
- Minor Contour (0.5m interval)
- Major Contour (1m interval)
- Concrete keystone Retaining Wall
- Timber Retaining Wall
- 12.9 — Offset dimension from boundary as shown on plan

REVISION (DESCRIPTIONS)	NAME	DATE
	NAME	DATE
SURVEYED	BJ	09/2016
DESIGNED	KM	09/2014
DRAWN	BJ	11/2016
CHECKED	BM	11/2016
APPROVED	TM	11/2016

CLIENT

Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

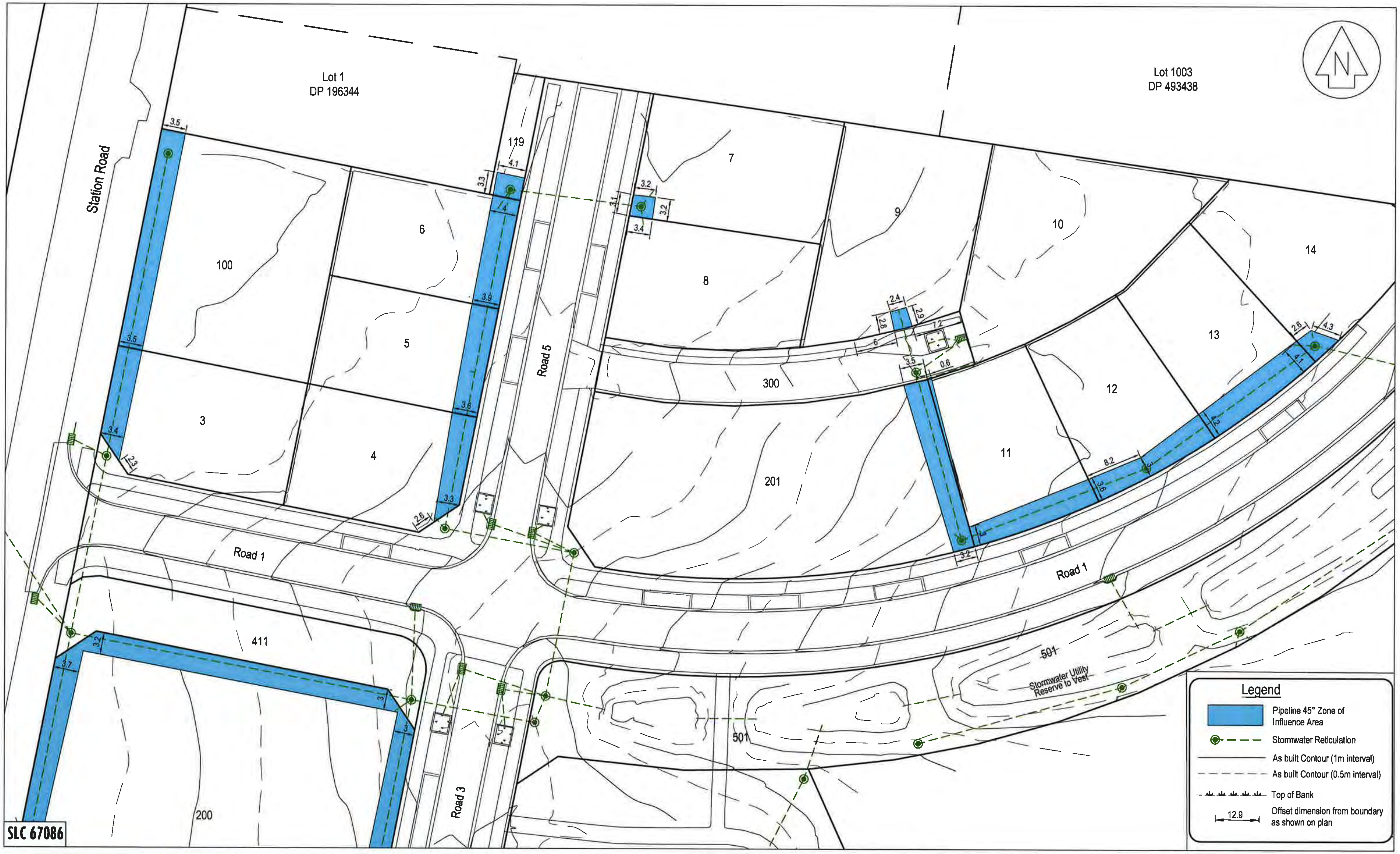
Retaining Wall
Specific Design Plan
Sheet 2 of 2

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

ORIGINAL SCALE 1:500	ORIGINAL SIZE A3	REVISION NO
DATE 07/11/16	CAD REFERENCE 32522 E619	SHEET NO E620
DIRECTORY Z:\31506\Acad		JOB NO 32522



CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE

	NAME	DATE
SURVEYED	BJ	09/2016
DESIGNED	KM	09/2014
DRAWN	BM	11/2016
CHECKED	TL	11/2016
APPROVED	TL	11/2016

This plan and accompanying report(s) have been prepared for the purpose of obtaining a resource consent only and for no other purpose. Use of this plan and/or the information on it for any other purpose is at the user's risk

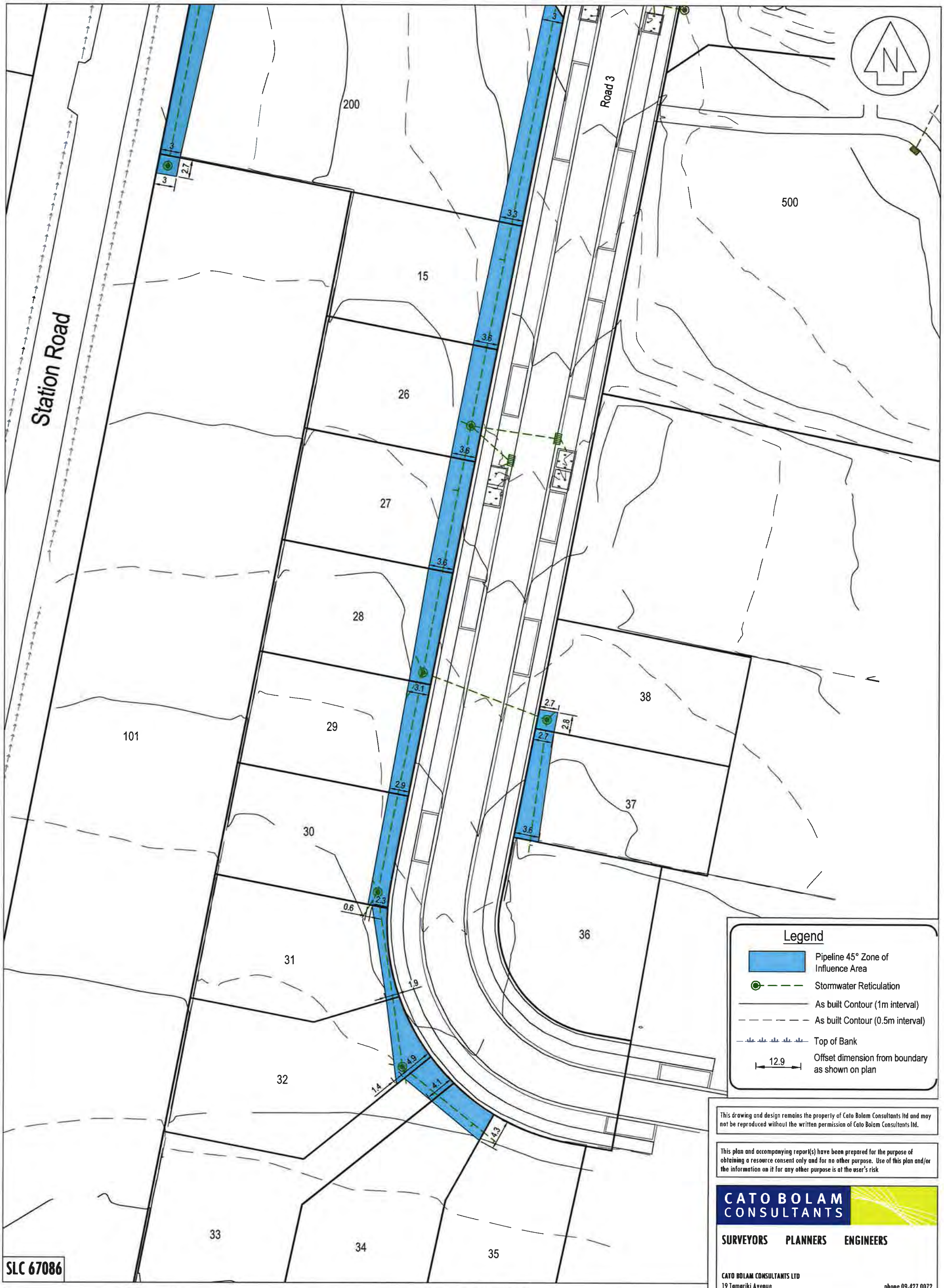
CLIENT

Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

Drainage Zone of Influence Plan
Sheet 1 of 2

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:500	A3	
DATE 15/11/16	CAD REFERENCE 32522 E621-622	SHEET NO E621
DIRECTORY Z:\32522\Acad		JOB NO 32522



SLC 67086

REVISION (DESCRIPTIONS)	NAME	DATE
	NAME	DATE
SURVEYED	BJ	09/2016
DESIGNED	KM	09/2014
DRAWN	BM	11/2016
CHECKED	TL	11/2016
APPROVED	TI	11/2016

CLIENT

Cabra Development Ltd
Huapai Triangle Sub Precinct B
Stage 1A & 3
Huapai

DRAWING TITLE

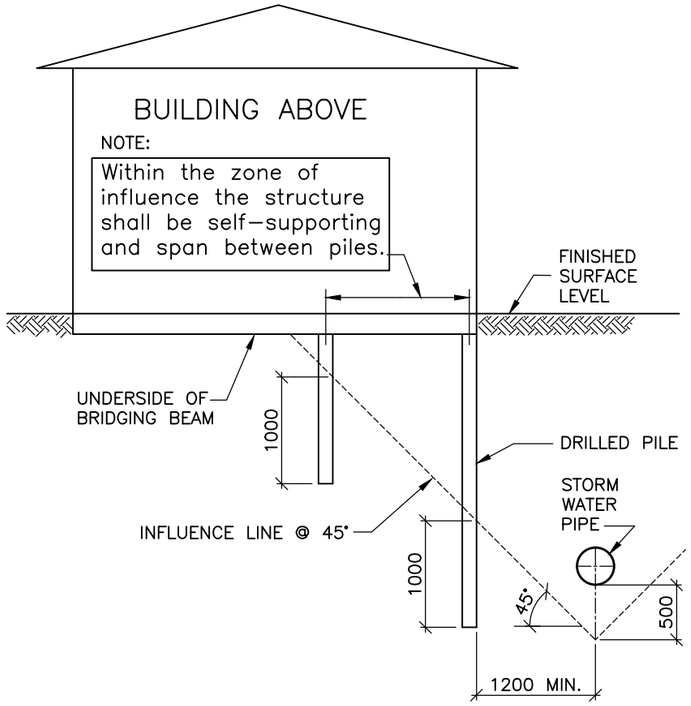
Drainage Zone of Influence Plan
Sheet 2 of 2

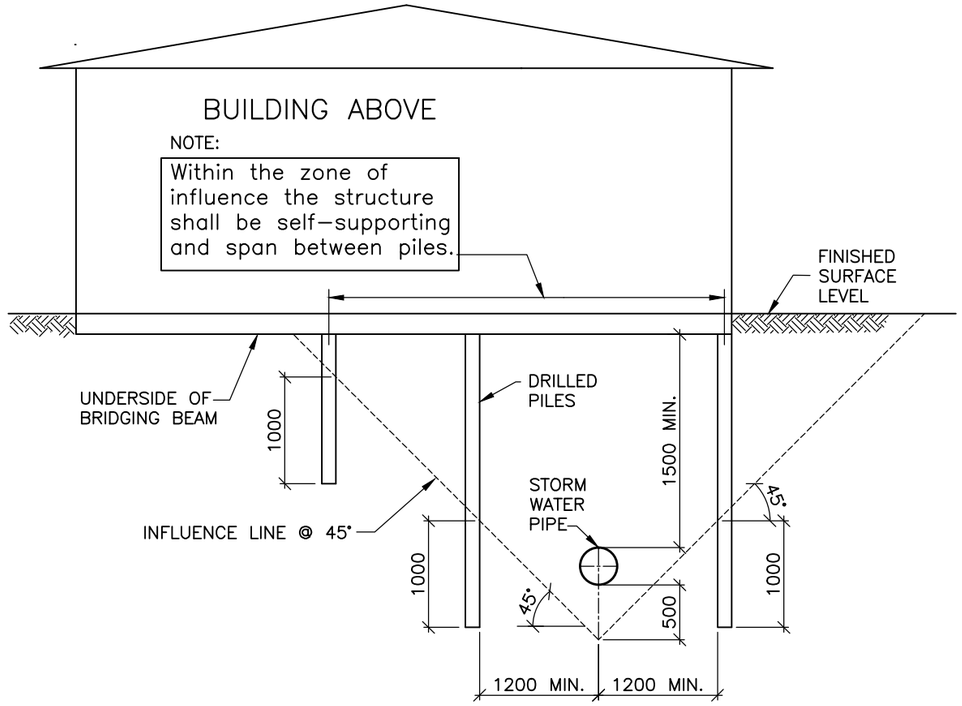
CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

ORIGINAL SCALE 1:500	ORIGINAL SIZE A3	REVISION NO
DATE 15/11/16	CAD REFERENCE 32522 E621-622	SHEET NO E622
DIRECTORY Z:\32522\Acad		JOB NO 32522





NOTES

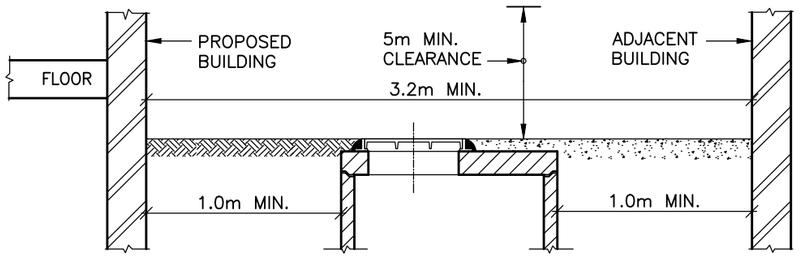
1. The information on this page is intended to show examples of typical scenarios and should be used for general guidance purposes only. Significant variations on a site by site basis are to be expected and it is in no way implied that meeting any of the above will guarantee approval.
2. Requirements for foundation design etc apply to both sides of pipe.
3. No driven piles are permitted within 10m of brick Stormwater Structures, or within 5m of all other Stormwater Structures.
4. Specific approval is required from Auckland Council for driven piles in partially drilled holes, within the 5m/10m zone.
5. Piles that may be required to resist horizontal forces will require specific design.
6. Pile/Footing location point must be below 45° "Zone of Influence".
7. All Manholes shall have 24 hours unobstructed access.
8. Manholes in basements, or where sufficient clearance is unavailable, are not permitted.
9. All pipe buildovers will require approval by Auckland Council.
10. Refer to section 4.3.21 for pipe buildover requirements.

"BUILD CLOSE" NOTES:

1. Specific approval is required from Auckland Council if building adjacent to pipes, larger than 375mm internal diameter, or greater than 3.0m of depth.
2. Building to be outside all overland flow paths and floodplains.
3. Pile constructed to a depth of 1.0m below influence line.
4. Outside zone of influence, normal foundation requirements apply.

"BUILD OVER" NOTES:

1. Applies to stormwater pipes 375mm nominal diameter or less.
2. Bridging over pipes larger than 375mm nominal diameter is NOT allowed under any circumstances.
3. Pile constructed to a depth of 1.0m below influence line.
4. Outside zone of influence, normal foundation requirements apply.
5. Bridging is NOT allowed over pipes where clear vertical seperation distance from top of pipe to underside of bridging beam is less than 1.5m



MANHOLE CONSTRUCTION CLEARANCE

STORMWATER ENGINEERING STANDARD DETAILS ISSUE/REVISION: 1 DATE: 30 September 2013 CAD FILE: AC–STD–SW22	AUCKLAND COUNCIL STORMWATER PIPE AND MANHOLE CONSTRUCTION CLEARANCE REQUIREMENTS MANHOLES NEAR BUILDINGS AND BUILDING CLOSE OR OVER PIPES	ENVIRONMENTAL–SW	ORIGINAL SCALE: AS NOTED	
		Auckland Council	Sht 1 OF 1 Shts	DRAWING No. ACSD SW22 / REV A3

Appendix C

Laboratory Test Data

ROADTEST LTD

Revision: 1

Report No: 16 0144 00

DETERMINATION OF THE LIQUID LIMIT & LINEAR SHRINKAGE
TEST METHOD NZS 4402 : 1986 TEST 2.2 & 2.6

Job:	**Station Road**		
Date of order:	15.6.16	Sample origin:	As below
Sample method:	Hand Auger	Sample Description:	-
Sample By:	RHD	Date:	13 & 14/06/16

Test Details :

Test performed on : whole soil
History : Natural

Sample No.	Location	Depth (m)	Liquid Limit	Linear Shrinkage	Natural Water Content (%)
E228A	Lot 38	0.4m - 0.6m	104	23	48.3
E229A	Lot 36	0.4m - 0.6m	91	23	44.3
E230A	Lot 69	0.4m - 0.6m	71	19	31.7
E231A	Lot 50	0.4m - 0.6m	82	19	35.9
E232A	Lot 32	0.4m - 0.6m	79	21	43.8
E234A	Lot 115	0.4m - 0.6m	86	22	38.2
E235A	Lot 64	0.4m - 0.6m	63	18	29.3
E236A	Lot 78	0.4m - 0.6m	66	17	29.5
E237A	Lot 203	0.4m - 0.6m	85	21	45.5

Comments :

Tested By:	EC	Date :	17,18,19/06/16
Calculated By :	EC	Date :	23.06.16
Checked By :	EC	Date :	27.06.16

ROADTEST LTD

Revision: 1

DETERMINATION OF THE LIQUID LIMIT & LINEAR SHRINKAGE
TEST METHOD NZS 4402 : 1986 TEST 2.2 & 2.6

Job:	**Station Road**		
Date of order:	-	Sample origin:	As below
Sample method:	-	Sample Description:	-
Sample By:	RHD/JMJ	Date:	15.06.16

Test Details :

Test performed on :	whole soil
History :	Natural

Sample No.	Location	Depth (m)	Liquid Limit	Linear Shrinkage	Natural Water Content (%)
945 D	LOT 108	0.4m - 0.6m	93	21	38.5
946 D	LOT 100/102	0.4m - 0.6m	98	22	40.3
947 D	LOT 20	0.4m - 0.6m	97	22	56.4
948 D	LOT 205	0.4m - 0.6m	73	17	42.6
949 D	LOT 26	0.4m - 0.6m	117	21	39.1
950 D	LOT 87	0.4m - 0.6m	69	18	36.9
951 D	LOT 43	0.4m - 0.6m	88	20	45.8
952 D	LOT 95	0.4m - 0.6m	89	21	48.7

Comments :

Tested By:	MC	Date :	20/22/23/24/25.06.16
Calculated By :	MC	Date :	27.06.16
Checked By :	EC	Date :	27.06.16

Appendix D

Field Test Data

LF11 Rev 1 Field Density NDM Soil Report

CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Client:	Cabra Developments Ltd
Project:	Corner Station Road and Nobilo Road
Location:	Huapai
Project No:	2015_1127
Report No:	2015_1127LAA Rev.0
Issue Date:	20/05/2016

Test Methods:
NZS 4407.3.1:1991
NZS 4407.4.2.1:1991
NZS 4407.4.2.2:1991

Notes:
Solid Density: Assumed (2.7 t/m3)

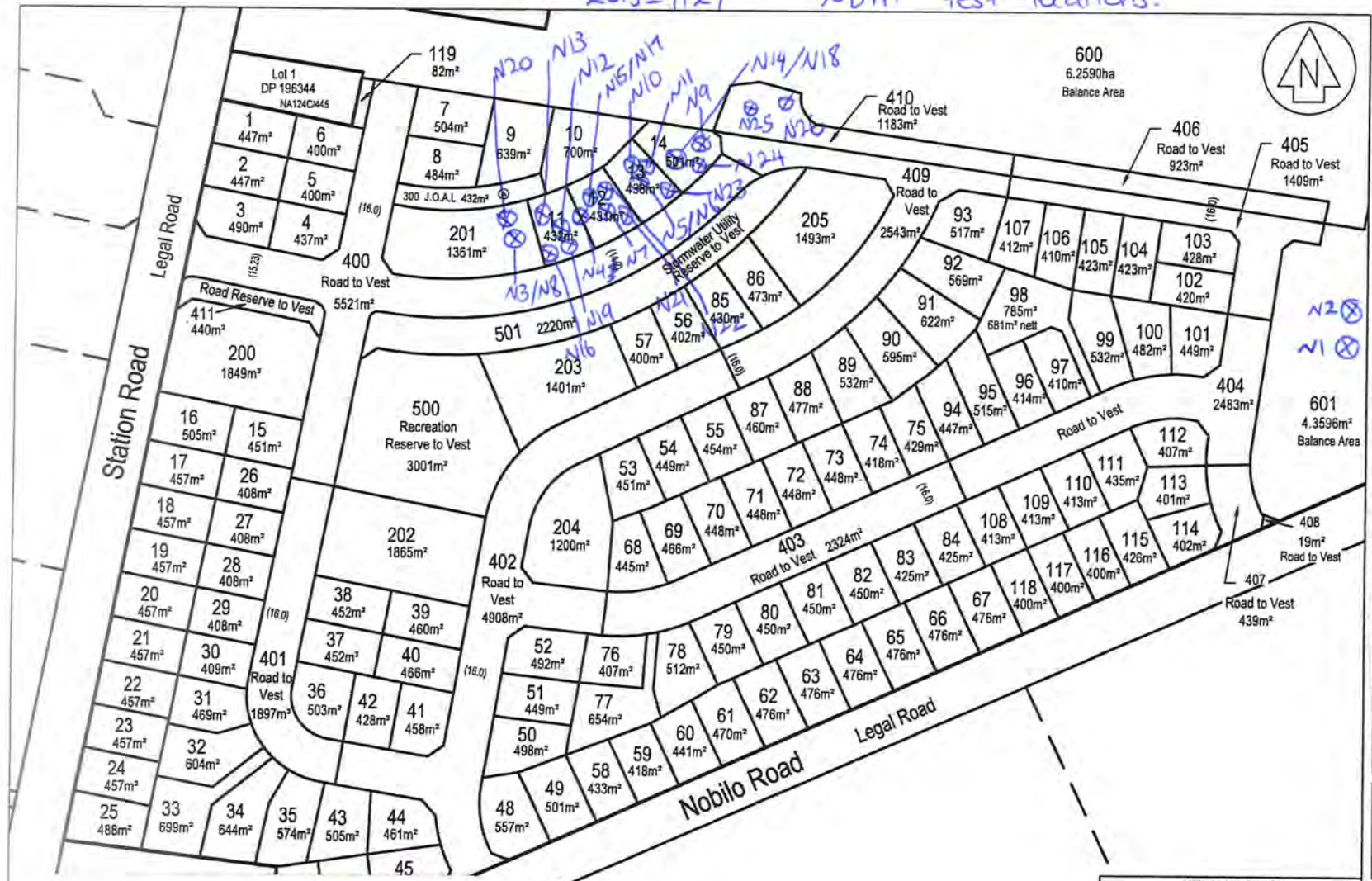
Endorsement:
IANZ ACCREDITED LABORATORY ACCREDITATION №: 1131

Authorised Signatory: Date: 20/05/16

Date Sampled	Sample No.	Test Location	Soil Description & Sample Details Undisturbed/Compacted/ Unknown	In-situ Vane Shear Strengths					Field and Laboratory Testing Data								Comments
				Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	Gauge Wet Density (t/m^3)	Gauge Dry Density (t/m^3)	Gauge Water Content (%)	Gauge Air Voids (%)	Oven Water Content (%)	Solid Density (t/m^3)	Oven Dry Density (t/m^3)	Calculated Air Voids (%)	
27/11/2015	N1	Temp silt pond (off-site)	CLAY	131	136	127	119	128	1.8136	1.3114	38.3	1.10	35.4	2.7	1.34	3.0	
	N2	Temp silt pond (off-site)	CLAY	110	116	115	131	118	1.8072	1.3181	37.1	2.16	37.9	2.7	1.32	1.8	
7/12/2015	N3	Lot 13	CLAY	>209	179	>209	194	>198	1.8073	1.3052	38.5	1.34	34.8	2.7	1.34	3.7	
	N4	Lot 11/12 Boundary	CLAY	>209	UTP	>209	>209	>209	1.8122	1.3265	36.6	2.20	32.6	2.7	1.36	4.8	
	N5	Lot 201	CLAY	>209	>209	>209	>209	>209	1.8382	1.3782	33.4	2.86	33.3	2.7	1.38	3.0	
8/12/2015	N6	Lot 13	CLAY	187	164	197	182	183	1.8366	1.3562	35.4	1.63	37.6	2.7	1.34	0.4	
	N7	Lot 12	CLAY	164	UTP	146	187	>177	1.9166	1.4781	29.71	1.31	31.5	2.7	1.46	0.1	
	N8	Lot 201	CLAY	194	164	>209	187	>189	1.8748	1.3611	37.7	-1.90	24.8	2.7	1.50	7.1	
9/12/2015	N9	Lot 14	CLAY	122	110	164	187	146	1.7992	1.2933	39.1	1.39	40.5	2.7	1.28	0.7	
	N10	Lot 13 North	CLAY	194	119	142	176	158	1.7974	1.3098	37.2	2.63	39.1	2.7	1.30	1.6	
	N11	Lot 11 North	CLAY	127	194	140	149	153	1.8396	1.3550	35.7	1.27	33.0	2.7	1.38	3.1	
	N12	Lot 13 South	CLAY	105	187	127	140	140									
	N13	Lot 11	CLAY	118	131	137	163	137									
10/12/2015	N14	Lot 14	CLAY	172	UTP	149	127	>164	1.8416	1.3629	35.1	1.55	35.7	2.7	1.36	1.3	Retest of N9
	N15	Lot 12	CLAY	131	105	149	145	133									Retest of N12
	N16	Lot 11	CLAY	131	>209	>209	199	>187	1.8173	1.3465	35.0	2.94	32.7	2.7	1.36	4.5	Retestof N13
	N17	Lot 12	CLAY	140	127	149	142	140	1.8063	1.3118	37.7	1.85	37.8	2.7	1.32	1.9	Retest of N15
	N18	Lot 14	CLAY	UTP	UTP	UTP	164	>198	1.8208	1.3387	36.0	2.10	28.9	2.7	1.42	6.8	
	N19	Lot 11	CLAY	UTP	>209	UTP	164	>198	1.8578	1.4246	30.4	3.82	29.8	2.7	1.44	4.3	
14/12/2015	N20	Lot 201 East	CLAY	UTP	UTP	182	202	>201	1.9082	1.4248	33.9	1.22	34.0	2.7	1.42	-1.2	
	N21	Lot 12	CLAY	206	164	164	185	180	1.7416	1.2966	34.3	7.38	36.9	2.7	1.28	6.0	
	N22	Lot 12	CLAY	206	164	164	185	180	1.8291	1.3718	33.3	3.36	35.1	2.7	1.36	2.3	
	N23	Lot 13	CLAY	170	188	206	182	187	1.8341	1.3328	37.6	0.40	34.8	2.7	1.36	2.3	
	N24	Lot 14 South	CLAY	>209	>209	203	>209	>208	1.7932	1.3023	37.7	2.56	36.6	2.7	1.32	3.3	
	N25	North of Lot 14	CLAY	UTP	>209	149	145	>178	1.8615	1.4409	29.2	4.48	29.1	2.7	1.44	4.6	
	N26	North of Lot 14	CLAY	67	82	157	82	97	1.7887	1.2918	38.5	2.35	34.5	2.7	1.34	4.9	

Created By: AP Date: 30/11/2015
Checked By: AP Date: 15/03/2016

205_1127 NDM test locations.



AUCKLAND COUNCIL Rodney Section

COMPRISED IN CT		
	NA81D/90	1.0000ha
	73233	4.1016ha
	73234	4.2206ha
	710970	4.3615ha
	710971	6.4696ha
TOTAL AREA		20.1533ha

LEVELS ARE IN TERMS OF LANDS AND SURVEY DATUM, AREAS AND MEASUREMENTS ARE SUBJECT TO SURVEY.

SCHEDULE OF EASEMENTS GROSS

PURPOSE	SHOWN	SERVIENT TENEMENT	GRANTEE
RIGHT TO CONVEY TELECOMMUNICATIONS & COMPUTER MEDIA	A	LOT 300	CHORUS NEW ZEALAND LTD
RIGHT TO CONVEY ELECTRICITY			VECTOR LTD
RIGHT TO CONVEY GAS			VECTOR GAS LTD

R1	Lots 411 & 200 amended	LS	02.16
REVISION (DESCRIPTIONS)		NAME	DATE

	NAME	DATE
SURVEYED		
DESIGNED	KM	12/15
DRAWN	LS	01.16
CHECKED		
APPROVED		

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email reception@catobolam.co.nz

CLIENT

CABRA DEVELOPMENTS LTD
CNR STATION ROAD AND
NOBILO ROAD, HUAPAI

TITLE

LOTS 1 - 119, 200 - 205, 300, 400 - 411, 500 - 501, 600, 601 BEING SUBDIVISION OF LOTS 1 & 2 DP 318693, LOT 2 DP 137997 & LOTS 2 & 3 DP 491124

SCHEDULE OF EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF WAY RIGHT TO CONVEY TELECOMMUNICATIONS COMPUTER MEDIA ELECTRICITY & GAS	A	LOT 300	LOT 201

Amalgamation Conditions

That Lot 300 be held as to 2 undivided half shares by the owners of Lots 9-10 hereon and individual Certificates of Title be issued in accordance therewith.

That Lot 119 be transferred to the owners of Lot 1 DP 196344 and that one Certificate of Title be issued in accordance therewith.

ORIGINAL SCALE 1 : 1500	ORIGINAL SIZE A3	REVISION NO R1
DATE JAN 2016	CAD REFERENCE 32522 S14.dwg	SHEET NO 1 S14
DIRECTORY Z:\32522\CAD\Drawings-Variation 4\		JOB NO 32522

CMW Geosciences

LF10 Rev 4 Soil Core Sample Density Report

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Project:	Corner Station Road and Nobilo Road
Project No:	2015_1127
Location:	Huapai
Report No:	2015_1127LAB Rev.0
Report Date:	20/05/2016
Client:	Cabra Developments Limited
Client Address:	19 Tamaraki Avenue PO Box 197 Orewa
Client Reference:	32522

Test Methods:
NZS 4402:1986 5.1.3
NZS 4402:1986 2.1

Notes:
Solid Density: Assumed
Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY ACCREDITATION Nº: 1131

Date Sampled	Sample No.	Test Location			Soil Description	In-situ Vane Shear Strengths					Field and Laboratory Testing Data					Comments
		Easting	Northing	RL/Details		Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	Bulk Density (t/m^3)	Dry Density (t/m^3)	Water Content (%)	Solid Density (t/m^3)	Calculated Air Voids (%)	
3/12/2015	C1	Temp silt pond (off-site)			CLAY	127	149	112	119	127	1.82	1.36	34.5	2.7	3.3	

Created By: AP Date: 14/12/2015
Checked By: CS Date: 20/05/2016
Authorised Signatory: Date: 20/05/2016

2015_1127 Cove test locations

SCHEDULE OF EASEMENTS			
PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF WAY RIGHT TO CONVEY TELECOMMUNICATIONS COMPUTER MEDIA ELECTRICITY & GAS	Ⓐ	LOT 300	LOT 201

Amalgamation Conditions

That Lot 300 be held as to 2 undivided half shares by the owners of Lots 9-10 hereon and individual Certificates of Title be issued in accordance therewith.

That Lot 119 be transferred to the owners of Lot 1 DP 196344 and that one Certificate of Title be issued in accordance therewith.

AUCKLAND COUNCIL Rodney Section

COMPRISED IN CT		
	NA81D/90	1.0000ha
	73233	4.1016ha
	73234	4.2206ha
	710970	4.3615ha
	710971	6.4696ha
TOTAL AREA		20.1533ha

LEVELS ARE IN TERMS OF LANDS AND SURVEY DATUM, AREAS AND MEASUREMENTS ARE SUBJECT TO SURVEY.

SCHEDULE OF EASEMENTS GROSS

PURPOSE	SHOWN	SERVIENT TENEMENT	GRANTEE
RIGHT TO CONVEY TELECOMMUNICATIONS & COMPUTER MEDIA	Ⓐ	LOT 300	CHORUS NEW ZEALAND LTD
RIGHT TO CONVEY ELECTRICITY			VECTOR LTD
RIGHT TO CONVEY GAS			VECTOR GAS LTD

REVISION (DESCRIPTIONS)	NAME	DATE
R1 Lots 411 & 200 amended	LS	02.16

	NAME	DATE
SURVEYED		
DESIGNED	KM	12/15
DRAWN	LS	01.16
CHECKED		
APPROVED		

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email orewabolam@catobolam.co.nz

CLIENT

CABRA DEVELOPMENTS LTD
CNR STATION ROAD AND
NOBILO ROAD, HUAPAI

TITLE

LOTS 1 - 119, 200 - 205, 300, 400 - 411, 500 - 501, 600, 601 BEING SUBDIVISION OF LOTS 1 & 2 DP 318693, LOT 2 DP 137997 & LOTS 2 & 3 DP 491124

ORIGINAL SCALE 1 : 1500	ORIGINAL SIZE A3	REVISION NO	R1
DATE JAN 2016	CAD REFERENCE 32522 S14.dwg	SHEET NO 1	S14
DIRECTORY Z:\32522\(ACAD)\Drawings-Variation A1		JOB NO	32522

CMW Geosciences

LF11 Rev 2 Field Density NDM Soil Report

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Project:	Corner Station Road and Nobilo Road
Project No:	2015_1127
Location:	Huapai
Report No:	2015_1127LAC Rev.0
Report Date:	20/05/2016
Client:	Cabra Developments Limited
Client Address:	
Client Reference:	

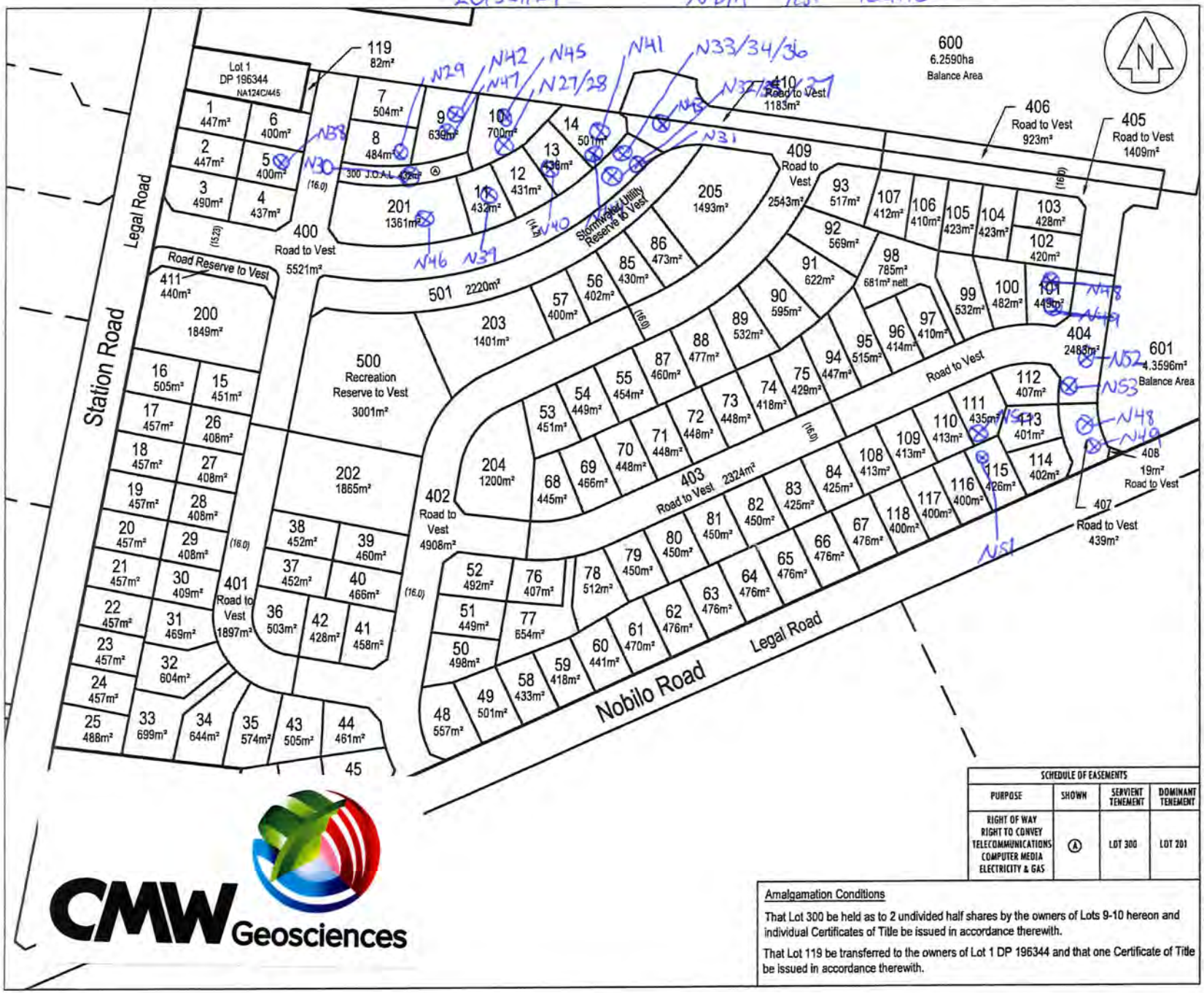
Test Methods:
NZS 4407.3.1:1991
NZS 4407.4.2.1:1991
NZS4407.4.2.2:1991

Notes:
Solid Density: Assumed
Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY ACCREDITATION Nº: 1131

Date Sampled	Sample No.	Test Location	Soil Description	In-situ Vane Shear Strengths					Field and Laboratory Testing Data								Comments
				Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	Gauge Wet Density (t/m^3)	Gauge Dry Density (t/m^3)	Gauge Water Content (%)	Gauge Air Voids (%)	Gauge Probe Depth	Oven Water Content (%)	Solid Density (t/m^3)	Oven Dry Density (t/m^3)	Calculated Air Voids (%)	
16/12/2015	N27	Lot 10	CLAY	151	146	151	145	148	1.7876	1.2928	38.3	2.53	300	33.3	2.7	1.34	5.7	
	N28	Lot 10	CLAY	151	146	151	145	148	1.7980	1.2898	39.4	1.30	300	38.8	2.7	1.30	1.7	
	N29	Lot 8	CLAY	140	146	164	131	145	1.8371	1.3080	40.4	-1.47	300	37.0	2.7	1.34	0.71	
	N30	Lot 4 North	CLAY	131	145	149	146	143	1.8079	1.2996	38.4	1.80	300	33.7	2.7	1.36	4.3	
18/12/2015	N31	Road by Lot 145	CLAY	149	145	164	140	150	1.8258	1.3310	37.2	1.12	300	33.6	2.7	1.36	3.5	
	N32	Road by Lot 145	CLAY	131	149	140	172	148	1.8059	1.2851	40.5	0.21	300	33.8	2.7	1.34	4.4	
	N33	Road by Lot 145	CLAY	149	100	131	115	124										VSS ONLY
	N34	Road by Lot 145	CLAY	127	131	134	149	135										VSS ONLY
	N35	Road by Lot 145	CLAY	103	127	118	139	122										VSS ONLY
21/12/2015	N36	Lot 145	CLAY	>191	>191	UTP	150	>180	1.775	1.295	37.0	3.9	300	40.2	2.7	1.26	2.2	Restest for N33
	N37	Lot 13	CLAY	>191	>191	>191	170	>185	1.809	1.360	33.0	4.6	300	35.2	2.7	1.34	3.3	Restest for N34/N35
	N38	Lot 5	CLAY	>191	>191	>191	>191	>191	1.799	1.312	37.1	2.58	300	33.4	2.7	1.34	5.0	
23/12/2015	N39	Lot 11	CLAY	>191	>191	>191	161	>183	1.836	1.348	36.1	1.2	300	33.7	2.7	1.38	2.9	
	N40	Lot 13	CLAY	>191	161	170	>191	>178	1.906	1.446	31.8	0.37	300	32.0	2.7	1.44	0.3	
	N41	Lot 14	CLAY	150	>191	161	163	>166	1.825	1.331	37.1	1.17	300	34.0	2.7	1.36	3.3	
	N42	Lot 9	CLAY	>191	>191	>191	>191	>191	1.789	1.302	38.1	2.05	300	35.2	2.7	1.32	4.4	
30/12/2015	N43	Lot 14	CLAY	152	177	>191	173	>173	1.828	1.314	39.1	-0.17	300	40.3	2.7	1.30	-0.76	
	N44	Lot 14	CLAY	>191	>191	>191	>191	>191	1.839	1.359	35.0	1.56	300	28.9	2.7	1.42	5.9	
	N45	Lot 10	CLAY	158	177	>191	162	>172	1.794	1.323	35.7	3.71	300	33.6	2.7	1.34	5.2	
	N46	Lot 9	CLAY	>191	>191	>191	>191	>191	1.832	1.383	32.5	3.70	300	28.1	2.7	1.42	6.8	
	N47	Lot 201	CLAY	167	>191	188	>191	<184	1.749	1.302	36.3	5.78	300	32.2	2.7	1.32	8.4	
18/01/2016	N48	Lot 101	CLAY	UTP	>209	>209	>209	>209	1.8681	1.3967	33.7	1.03	300	32.7	2.7	1.40	1.8	
	N49	Lot 101	CLAY	UTP	167	176	178	>183	1.8092	1.3077	38.4	1.31	300	34.0	2.7	1.36	4.1	
	N50	Lot 103	CLAY	UTP	>209	142	>209	>192	1.8123	1.3078	38.6	1.00	300	34.8	2.7	1.34	3.4	
	N51	Lot 103	CLAY	194	148	140	>209	>173	1.7737	1.2774	38.9	2.95	300	37.0	2.7	1.30	4.1	
21/01/2016	N52	Lot 101	CLAY	>209	157	>209	UTP	>196	1.8839	1.4552	29.5	3.14	300	34.8	2.7	1.40	-0.4	
26/01/2016	N53	Lot 99	CLAY	UTP	UTP	>209	UTP	>209	1.7681	1.2976	36.3	4.78	300	33.0	2.7	1.32	6.9	

Created By: AP Date: 17/12/2015
Checked By: AP Date: 16/02/2016
Authorised Signatory: Date: 20/05/2016



AUCKLAND COUNCIL Rodney Section

COMPRISED IN CT	NA81D/90	1.0000ha
	73233	4.1016ha
	73234	4.2206ha
	710970	4.3615ha
	710971	6.4696ha
TOTAL AREA		20.1533ha

LEVELS ARE IN TERMS OF LANDS AND SURVEY DATUM, AREAS AND MEASUREMENTS ARE SUBJECT TO SURVEY.

SCHEDULE OF EASEMENTS GROSS

PURPOSE	SHOWN	SERVIENT TENEMENT	GRANTEE
RIGHT TO CONVEY TELECOMMUNICATIONS & COMPUTER MEDIA	Ⓐ	LOT 300	CHORUS NEW ZEALAND LTD
RIGHT TO CONVEY ELECTRICITY			VECTOR LTD
RIGHT TO CONVEY GAS			VECTOR GAS LTD

REVISION (DESCRIPTIONS)	NAME	DATE
R1 Lots 411 & 200 amended	LS	02.16

	NAME	DATE
SURVEYED		
DESIGNED	RM	12/15
DRAWN	LS	01.16
CHECKED		
APPROVED		

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 137
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

CLIENT

CABRA DEVELOPMENTS LTD
CNR STATION ROAD AND
NOBILO ROAD, HUAPAI

TITLE

LOTS 1 - 119, 200 - 205, 300, 400 - 411, 500 - 501, 600, 601 BEING SUBDIVISION OF LOTS 1 & 2 DP 318693, LOT 2 DP 137997 & LOTS 2 & 3 DP 491124

SCHEDULE OF EASEMENTS

PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF WAY RIGHT TO CONVEY TELECOMMUNICATIONS COMPUTER MEDIA ELECTRICITY & GAS	Ⓐ	LOT 300	LOT 201

Amalgamation Conditions

That Lot 300 be held as to 2 undivided half shares by the owners of Lots 9-10 hereon and individual Certificates of Title be issued in accordance therewith.

That Lot 119 be transferred to the owners of Lot 1 DP 196344 and that one Certificate of Title be issued in accordance therewith.

ORIGINAL SCALE	1 : 1500	ORIGINAL SIZE	A3
DATE	JAN 2016	CAD REFERENCE	32522 S14.dwg
DIRECTORY	Z:\32522\CAD\Drawings-Variation A\		
REVISION NO	R1		
SHEET NO	1	S14	
JOB NO	32522		

CMW Geosciences

LF11 Rev 2 Field Density NDM Soil Report

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Project:	Corner Station Road and Nobilo Road
Project No:	2015_1127
Location:	Huapai
Report No:	2015_1127LAD Rev.0
Report Date:	20/05/2016
Client:	Cabra Developments Limited
Client Address:	
Client Reference:	

Test Methods:
NZS 4407.3.1:1991
NZS 4407.4.2.1:1991
NZS4407.4.2.2:1991

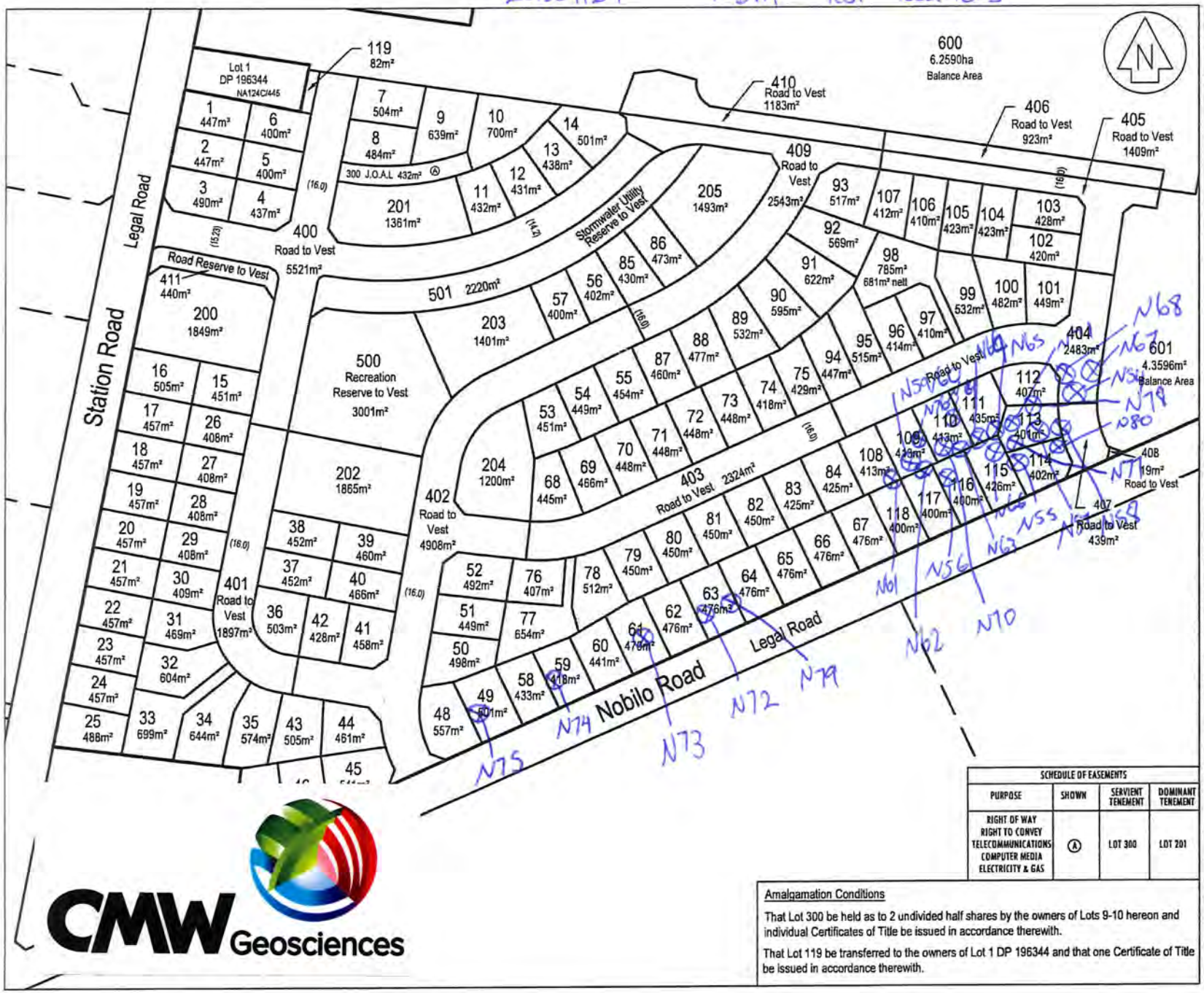
Notes:
Solid Density: Assumed
Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY ACCREDITATION Nº: 1131

Date Sampled	Sample No.	Test Location: Easting	Northing	RL/Details	Soil Description	In-situ Vane Shear Strengths: Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	Field and Laboratory Testing Data: Gauge Wet Density (t/m³)	Gauge Dry Density (t/m³)	Gauge Water Content (%)	Gauge Air Voids (%)	Gauge Probe Depth	Oven Water Content (%)	Solid Density (t/m³)	Oven Dry Density (t/m³)	Calculated Air Voids (%)	Comments
26/01/2016	N54	Lot 103			CLAY	187	UTP	>209	133	>185	1.7829	1.3114	35.9	4.18	300	32.4	2.7	1.34	6.5	
	N55	Lot 108 East			CLAY	164	UTP	194	>209	>194	1.8405	1.4074	30.8	4.47	300	30.4	2.7	1.42	4.8	
	N56	Lot 84			CLAY	187	164	146	169	167	1.8140	1.3109	38.4	1.03	300	32.7	2.7	1.36	4.7	
29/01/2016	N57	Lot 83			CLAY	164	176	UTP	166	>179										
	N58	Lot 67			CLAY	160	140	164	182	162										
	N59	Lot 103			CLAY	105	115	146	127	123										
	N60	Lot 103			CLAY	97	131	140	119	122										
2/02/2016	N61	Lot 84			CLAY	164	131	149	157	150	1.8777	1.4311	31.2	2.24	300	28.4	2.7	1.46	4.3	Retest of N57
	N62	Lot 108			CLAY	UTP	UTP	UTP	UTP	>209	1.8772	1.4109	33.1	1.01	300	30.0	2.7	1.44	3.2	Retest of N58
	N63	Lot 103			CLAY	>209	>209	>209	>209	>209	1.8028	1.3502	33.5	4.63	300	39.6	2.7	1.30	1.1	Retest of N59
	N64	Lot 104			CLAY	>209	>209	>209	>209	>209	1.8155	1.3774	31.8	5.07	300	27.0	2.7	1.42	8.5	Retest of N60
	N65	Lot 100			CLAY	UTP	UTP	UTP	UTP	>209	1.7337	1.3439	29.0	11.16	300	28.7	2.7	1.34	11.0	
3/02/2016	N66	Road by Lot 103			CLAY	>209	194	190	>209	>201	1.8122	1.3929	30.1	6.39	300	30.8	2.7	1.38	6.0	
	N67	Lot 100			CLAY	UTP	>209	UTP	UTP	>209	1.8195	1.3983	30.1	6.00	300	32.6	2.7	1.38	4.4	
4/02/2016	N68	Lot 100			CLAY	167	164	146	143	155	1.8714	1.4188	31.9	2.09	300	33.6	2.7	1.40	1.1	Retest of N65
9/02/2016	N69	Lot 84			CLAY	169	155	191	177	173	1.8642	1.3867	34.4	0.78	300	30.7	2.7	1.42	3.4	
	N70	Lot 103			CLAY	>198	162	>198	172	>183	1.8164	1.3540	34.1	3.51	300	36.8	2.7	1.32	1.9	
	N71	Lot 99			CLAY	155	140	153	137	146	1.8785	1.3817	36.0	-0.96	300	30.6	2.7	1.44	2.7	
	N72	Lot 62			CLAY	155	157	143	167	156	1.7895	1.2985	37.8	2.70	300	37.8	2.7	1.30	2.8	
	N73	Lot 60			CLAY	UTP	UTP	UTP	UTP	>198	1.9072	1.4790	29.0	2.31	300	28.6	2.7	1.48	2.7	
	N74	Lot 58			CLAY	UTP	UTP	UTP	UTP	>198	1.9063	1.4495	31.5	0.52	300	25.4	2.7	1.52	5.1	
	N75	Lot 48			CLAY	UTP	UTP	177	>198	>193	1.8502	1.3514	36.9	-0.04	300	33.3	2.7	1.38	2.4	
11/02/2016	N76	Lot 83			CLAY	>198	184	>198	177	>189	1.8494	1.3368	38.3	-0.89	300	35.3	2.7	1.36	1.1	
	N77	Lot 108			CLAY	155	UTP	181	164	>175	1.8021	1.3169	36.8	2.60	300	37.4	2.7	1.32	2.4	
	N78	Lot 103			CLAY	>198	>198	155	171	>181	1.8489	1.3751	34.5	1.59	300	30.2	2.7	1.42	4.5	
	N79	Lot 63			CLAY	UTP	UTP	UTP	UTP	>198	1.8818	1.4178	32.7	0.99	300	28.0	2.7	1.48	4.4	
16/02/2016	N80	Lot 57			CLAY	169	171	129	162	158	1.7983	1.2933	39.0	1.49	300	37.0	2.7	1.32	2.8	

Created By: AP Date: 27/01/2016
Checked By: CS Date: 20/05/2016
Authorised Signatory: Date: 20/05/2016

2015_1127 NDM test locations



SCHEDULE OF EASEMENTS			
PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF WAY RIGHT TO CONVEY TELECOMMUNICATIONS COMPUTER MEDIA ELECTRICITY & GAS	(A)	LOT 300	LOT 201

Amalgamation Conditions

That Lot 300 be held as to 2 undivided half shares by the owners of Lots 9-10 hereon and individual Certificates of Title be issued in accordance therewith.

That Lot 119 be transferred to the owners of Lot 1 DP 196344 and that one Certificate of Title be issued in accordance therewith.

CMW Geosciences

AUCKLAND COUNCIL Rodney Section

COMPRISED IN CT		
	NA81D/90	1.0000ha
	73233	4.1016ha
	73234	4.2206ha
	710970	4.3615ha
	710971	6.4696ha
TOTAL AREA		20.1533ha

LEVELS ARE IN TERMS OF LANDS AND SURVEY DATUM, AREAS AND MEASUREMENTS ARE SUBJECT TO SURVEY.

SCHEDULE OF EASEMENTS GROSS			
PURPOSE	SHOWN	SERVIENT TENEMENT	GRANTEE
RIGHT TO CONVEY TELECOMMUNICATIONS & COMPUTER MEDIA	(A)	LOT 300	CHORUS NEW ZEALAND LTD
RIGHT TO CONVEY ELECTRICITY			VECTOR LTD
RIGHT TO CONVEY GAS			VECTOR GAS LTD

R1	Lots 411 & 200 amended	LS	02.16
REVISION	(DESCRIPTIONS)	NAME	DATE

	NAME	DATE
SURVEYED		
DESIGNED	KW	12/15
DRAWN	LS	01.16
CHECKED		
APPROVED		

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

CLIENT

CABRA DEVELOPMENTS LTD
CNR STATION ROAD AND
NOBILO ROAD, HUAPAI

TITLE

LOTS 1 - 119, 200 - 205, 300, 400 - 411, 500 - 501, 600, 601 BEING SUBDIVISION OF LOTS 1 & 2 DP 318693, LOT 2 DP 137997 & LOTS 2 & 3 DP 491124

ORIGINAL SCALE	1 : 1500	ORIGINAL SIZE	A3
DATE	JAN 2016	CAD REFERENCE	32522 S14.dwg
DIRECTORY	2-32522\CAD\ Drawings-Revision A\		
REVISION NO	R1		
SHEET NO	1 S14		
JOB NO	32522		

LF11 Rev 2 Field Density NDM Soil Report

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Project:	Corner Station Road and Nobilo Road
Project No:	2015_1127
Location:	Huapai
Report No:	2015_1127LAE Rev.0
Report Date:	20/05/2016
Client:	Cabra Developments Limited
Client Address:	
Client Reference:	

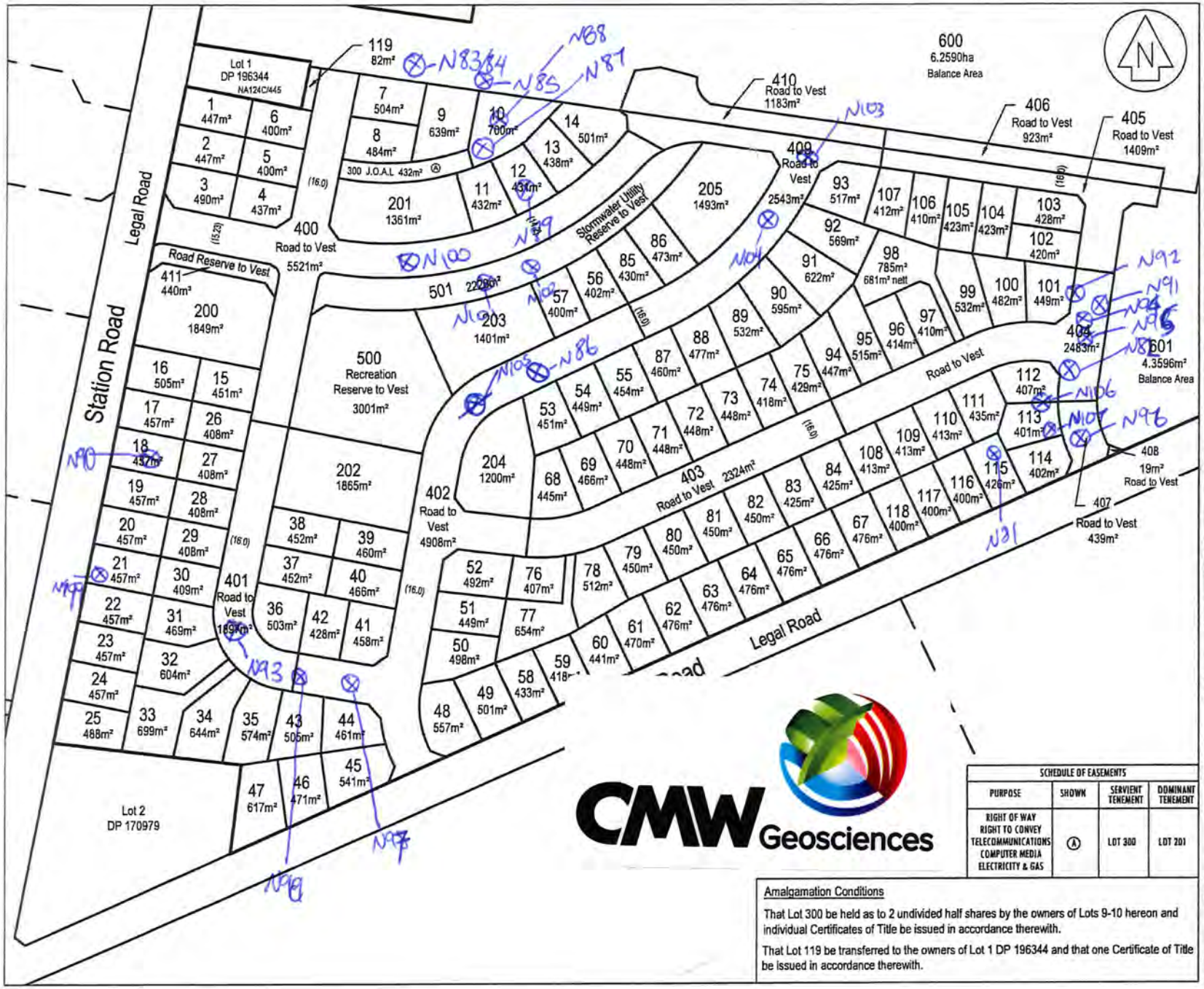
Test Methods:
NZS 4407.3.1:1991
NZS 4407.4.2.1:1991
NZS4407.4.2.2:1991

Notes:
Solid Density: Assumed
Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY ACCREDITATION Nº: 1131

Date Sampled	Sample No.	Test Location			Soil Description	In-situ Vane Shear Strengths					Field and Laboratory Testing Data									Comments
		Easting	Northing	RL/Details		Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	Gauge Wet Density (t/m^3)	Gauge Dry Density (t/m^3)	Gauge Water Content (%)	Gauge Air Voids (%)	Gauge Probe Depth	Oven Water Content (%)	Solid Density (t/m^3)	Oven Dry Density (t/m^3)	Calculated Air Voids (%)	
16/02/2016	N81	Lot 57			CLAY	169	171	129	162	158	1.8349	1.3055	40.6	-1.41	300	37.1	2.7	1.34	0.8	
	N82	Lot 103			CLAY	UTP	UTP	UTP	137	>183	1.8284	1.3365	36.8	1.20	300	34.5	2.7	1.36	2.7	
24/02/2016	N83	North Western Area			CLAY	183	176	>197	186	>186	1.8517	1.3704	35.1	1.01	300	31.9	2.7	1.40	3.2	
[redacted]	[redacted]	[redacted]			[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	1.8028	1.3663	31.9	5.65	300	37.3	2.7	1.32	2.4	[redacted]
[redacted]	[redacted]	[redacted]			[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	1.8199	1.3196	37.9	0.98	300	37.6	2.7	1.32	1.3	[redacted]
14/03/2016	N86	South of lot 203			CLAY	>198	>198	>198	>198	>198	1.8070	1.3328	35.6	3.11	300	33.0	2.7	1.36	4.9	
15/03/2016	N87	Lot 10			CLAY	184	186	>198	>198	>192										
17/03/2016	N88	Lot 103			CLAY	>198	195	175	158	>182	1.8470	1.4211	30.1	4.61	300	30.5	2.7	1.42	4.4	
	N89	Lot 12			CLAY	161	184	>198	>198	>185	1.8215	1.3623	30.2	2.60	300	31.5	2.7	1.38	5.1	
	N90	Lot 18			CLAY	UTP	UTP	UTP	UTP	>198	1.7990	1.3510	33.1	5.07	150	31.9	2.7	1.36	6.0	
29/03/2016	N91	Lot 118			CLAY	141	186	184	150	165	1.7833	1.3183	35.3	4.57	300	35.3	2.7	1.32	4.7	
	N92	Lot 117			CLAY	>198	>198	>198	UTP	>198	1.7966	1.3149	36.6	3.03	300	44.5	2.7	1.24	-1.4	
31/03/2016	N93	Road 3 undercut fill			CLAY	UTP	UTP	UTP	UTP	>198	1.8895	1.4120	33.8	-0.15	250	30.6	2.7	1.44	2.2	
5/04/2016	N94	Lot 118 South			CLAY	155	158	181	186	170	1.8283	1.3659	33.9	3.07	300	34.1	2.7	1.36	3.0	
	N95	Lot 118 North			CLAY	158	153	147	147	151	1.8006	1.3234	36.1	3.16	300	38.6	2.7	1.30	1.7	Retest of N92
	N96	Lot 107			CLAY	>198	>198	UTP	UTP	>198	1.7802	1.3105	35.8	4.39	300	32.4	2.7	1.34	6.6	
	N97	Road 3 undercut fill			CLAY	144	147	155	161	152	1.8811	1.3829	36.0	-1.15	300	33.3	2.7	1.42	0.7	
	N98	Road 3 undercut fill			CLAY	144	155	161	153	153	1.8464	1.3414	37.7	-0.30	300	33.1	2.7	1.38	2.7	
	N99	Lot 21			CLAY	>198	195	175	158	>182										
6/04/2016	N100	Road 1 Undercut Fill			CLAY	UTP	UTP	>198	>198	>198	1.8964	1.4263	33.0	0.06	250	30.1	2.7	1.46	2.1	
14/04/2016	N101	Swale Drain West			CLAY	161	155	186	195	174	1.8598	1.4125	31.7	2.86	250	33.9	2.7	1.38	1.5	
	N102	Swale Drain East			CLAY	153	161	147	141	151	1.7790	1.3219	34.6	5.23	250	33.9	2.7	1.32	5.7	
	N103	Road 2 undercut Fill East			CLAY	155	161	186	198	175	1.8118	1.3148	37.8	1.50	300	33.5	2.7	1.36	4.3	
	N104	Road 2 undercut Fill East			CLAY	158	164	172	198	173	1.8788	1.4022	34.0	0.30	300	34.4	2.7	1.40	0.2	
	N105	Road 2 Undercut Fill West			CLAY	>198	>198	>198	>198	>198	1.8315	1.3279	37.9	0.34	300	32.7	2.7	1.38	3.8	
27/04/2016	N106	Lot 103			CLAY	>198	>198	>198	>198	>198	1.8647	1.3916	34.0	1.05	300	31.7	2.7	1.42	2.7	
	N107	Lot 105			CLAY	155	175	>198	>198	>182	1.8616	1.3657	36.3	-0.28	300	31.6	2.7	1.42	2.9	

Created By: AP Date: 17/02/2016
Checked By: CS Date: 20/05/2016
Authorised Signatory: Date: 20/05/2016



CMW Geosciences

SCHEDULE OF EASEMENTS			
PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF WAY RIGHT TO CONVEY TELECOMMUNICATIONS COMPUTER MEDIA ELECTRICITY & GAS	(A)	LOT 300	LOT 201

Amalgamation Conditions

That Lot 300 be held as to 2 undivided half shares by the owners of Lots 9-10 hereon and individual Certificates of Title be issued in accordance therewith.

That Lot 119 be transferred to the owners of Lot 1 DP 196344 and that one Certificate of Title be issued in accordance therewith.

AUCKLAND COUNCIL Rodney Section

COMPRISED IN CT		
	NA81D/90	1.0000ha
	73233	4.1016ha
	73234	4.2206ha
	710970	4.3615ha
	710971	6.4696ha
TOTAL AREA		20.1533ha

LEVELS ARE IN TERMS OF LANDS AND SURVEY DATUM, AREAS AND MEASUREMENTS ARE SUBJECT TO SURVEY.

SCHEDULE OF EASEMENTS GROSS			
PURPOSE	SHOWN	SERVIENT TENEMENT	GRANTEE
RIGHT TO CONVEY TELECOMMUNICATIONS & COMPUTER MEDIA	(A)	LOT 300	CHORUS NEW ZEALAND LTD
RIGHT TO CONVEY ELECTRICITY			VECTOR LTD
RIGHT TO CONVEY GAS			VECTOR GAS LTD

REVISION (DESCRIPTIONS)	NAME	DATE
R1 Lots 411 & 200 amended	LS	02.16

	NAME	DATE
SURVEYED		
DESIGNED	KM	12/15
DRAWN	LS	01.16
CHECKED		
APPROVED		

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 137
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email orewa@catobolam.co.nz

CLIENT

CABRA DEVELOPMENTS LTD
CNR STATION ROAD AND
NOBILO ROAD, HUAPAI

TITLE

LOTS 1 - 119, 200 - 205, 300, 400 - 411, 500 - 501, 600, 601 BEING SUBDIVISION OF LOTS 1 & 2 DP 318693, LOT 2 DP 137997 & LOTS 2 & 3 DP 491124

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1 : 1500	A3	R1
DATE	CAD REFERENCE	SHEET NO
JAN 2016	32522 S14.dwg	S14
DIRECTORY		JOB NO
Z:\32522\ACAD\Drawings-Revision A\		32522

CMW Geosciences

LT34 Rev.5 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: test 6.5.2: 1988

Report No:	2015_1127LAF Rev 0
Project Name:	Corner Station and Mobile Road
Project Location:	Huapai
Project Number:	2015_1127
Test Date:	22/03/2016
Client:	Cabra Developments Ltd
Client Address:	PO Box 197 Orewa 0946
Client Reference:	

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY

Test No.	1		2		3		4		5	
Test Location	Road 3		Road 3		Road 3		Road 3		Road 3	
Chainage & Offset	220/LHS		200/RHS		180/LHS		160/RHS		140/LHS	
Material & Layer:	CLAY/Subgrade		CLAY/Subgrade		CLAY/Subgrade		CLAY/Subgrade		CLAY/Subgrade	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	5	10	2	4	4	8	2	4	3	6
100 - 200	3	6	2	4	3	6	2	4	1	2
200 - 300	3	6	3	6	2	4	1	2	1	2
300 - 400	2	4	2	4	4	8	2	4	1	2
400 - 500	3	6	3	6	4	8	1	2	1	2
500 - 600	3	6	5	10	6	13	1	2	1	2
600 - 700	2	4	6	13	7	15	2	4	1	2
700 - 800	4	8	8	18	8	18	3	6	1	2
800 - 900	4	8	8	18	8	18	3	6	2	4
900 - 1000										

Test No.	6		7		8		9		10	
Test Location	Road 3		Road 3		Road 3		Road 3		Road 3	
Chainage & Offset	120/RHS		100/LHS		80/RHS		60/LHS		40/RHS	
Material & Layer:	CLAY/Subgrade		CLAY/Subgrade		CLAY/Subgrade		CLAY/Subgrade		CLAY/Subgrade	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	1	2	5	10	7	15	4	8	6	13
100 - 200	1	2	3	6	6	13	4	8	3	6
200 - 300	1	2	3	6	4	8	3	6	3	6
300 - 400	2	4	4	8	3	6	3	6	3	6
400 - 500	2	4	3	6	3	6	3	6	3	6
500 - 600	2	4	4	8	1	2	3	6	4	8
600 - 700	3	6	5	10	2	4	2	4	3	6
700 - 800	3	6	6	13	4	8	2	4	4	8
800 - 900	6	13	7	15	3	6	3	6	4	8
900 - 1000										

Prepared by: AP Date: 12/04/2016

Checked by: JmJ Date: 18/4/2016

Authorised Signatory: Jack Myrtt-Johnson Date: 19/4/2016

*Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils.

LF1A Rev.6

Dynamic Cone Penetration (DCP) Test Report

NZS 4402: test 6.5.2. 1988

Report No:	2015_1127LAF Rev.0
Project Name:	Corner Station and Nobilo Road
Project Location:	Huapai
Project Number:	2015_1127
Test Date:	22/03/2016
Client:	Cabra Developments Ltd
Client Address:	PO Box 197 Orewa 0946
Client Reference:	

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

Test No.	11		12		13		14		15	
Test Location	Road 3		Road 3		Road 5		Road 5		Road 5	
Chainage & Offset	20/LHS		0/LHS		20/LHS		40/RHS		60/LHS	
Material & Layer:	CLAY/Subgrade		CLAY/Subgrade		CLAY/Subgrade		CLAY/Subgrade		CLAY/Subgrade	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	5	10	5	10	8	18	9	20	4	8
100 - 200	3	6	3	6	6	13	5	10	2	4
200 - 300	3	6	3	6	4	8	4	8	1	2
300 - 400	5	10	5	10	5	10	4	8	2	4
400 - 500	3	6	3	6	5	10	3	6	2	4
500 - 600	5	10	5	10	4	8	6	13	2	4
600 - 700	5	10	6	13	3	6	6	13	2	4
700 - 800	6	13	5	10	3	6	8	18	2	4
800 - 900	5	10	6	13	5	10	9	20	2	4
900 - 1000										

Test No.	16		17		18		19		20	
Test Location	Road 1		Road 1		Road 1		Road 1		Road 1	
Chainage & Offset	20/LHS		40/RHS		60/LHS		80/RHS		100/LHS	
Material & Layer:	CLAY/Subgrade		CLAY/Subgrade		CLAY/Subgrade		CLAY/Subgrade		CLAY/Subgrade	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	6	13	4	8	6	13	7	15	7	15
100 - 200	4	8	4	8	4	8	4	8	7	15
200 - 300	6	13	5	10	3	6	3	6	5	10
300 - 400	6	13	4	8	4	8	4	8	7	15
400 - 500	5	10	3	6	5	10	4	8	7	15
500 - 600	6	13	3	6	5	10	3	6	5	10
600 - 700	5	10	3	6	6	13	4	8	5	10
700 - 800	5	10	2	4	7	15	4	8	6	13
800 - 900	6	13	2	4	6	13	6	13	9	20
900 - 1000										

Prepared by: AP Date: 12/04/2016

Checked by: JMJ Date: 18/4/2016

Authorised Signatory: Jools Mynett-Johnson Date: 19/4/2016

*Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils.

LF14 Rev.5 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: test 6.5.2: 1988

Report No:	2015_3127LAF Rev.0
Project Name:	Corner Station and Nobilo Road
Project Location:	Huapai
Project Number:	2015_3127
Test Date:	22/03/2016
Client:	Cabra Developments Ltd
Client Address:	PO Box 197 Orewa 0946
Client Reference:	

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY

Test No.	21		22		23		24		25	
Test Location	Road 1		Road 1		Road 1		Road 1		Road 1	
Chainage & Offset	120/RHS		140/LHS		160/RHS		180/LHS		200/RHS	
Material & Layer:	CLAY/Subgrade		CLAY/Subgrade		CLAY/Subgrade		CLAY/Subgrade		CLAY/Subgrade	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	4	8	3	6	3	6	4	8	6	13
100 - 200	3	6	3	6	3	6	3	6	3	6
200 - 300	4	8	2	4	2	4	2	4	3	6
300 - 400	3	6	3	6	2	4	2	4	3	6
400 - 500	3	6	1	2	1	2	2	4	2	4
500 - 600	2	4	2	4	1	2	2	4	2	4
600 - 700	3	6	3	6	2	4	3	6	3	6
700 - 800	4	8	3	6	3	6	2	4	2	4
800 - 900	6	13	4	8	3	6	3	6	2	4
900 - 1000										

Test No.	26		27		28		29		30	
Test Location										
Chainage & Offset										
Material & Layer:										
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100										
100 - 200										
200 - 300										
300 - 400										
400 - 500										
500 - 600										
600 - 700										
700 - 800										
800 - 900										
900 - 1000										

Prepared by: AP Date: 12/04/2016

Checked by: JMS Date: 18/4/2016

Authorised Signatory: Jacob Mygelt-Johnsen Date: 19/4/2016

*Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils.

LF14 Rev.5 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: test 6.5.2: 1988

Report No:	2015_1127LAG Rev.0
Project Name:	Station Road
Project Location:	Corner of Station and Nobilo Road
Project Number:	2015_1127
Test Date:	4/05/2016
Client:	CABRA Developments
Client Address:	
Client Reference:	

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY ACCREDITATION Nº: 1131

Test No.	1		2		3		4		5	
Test Location	Road 6		Road 6		Road 6		Road 6		Road 6	
Chainage & Offset	CH0 L		CH10 R		CH30 L		CH50 R		CH70 L	
Material & Layer:	Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	4	8	3	6	3	6	4	8	9	20
100 - 200	5	10	3	6	3	6	2	4	11	20+
200 - 300	3	6	2	4	3	6	3	6	10	20+
300 - 400	3	6	2	4	3	6	7	15	9	20
400 - 500	4	8	3	6	2	4	4	8	9	20
500 - 600	3	6	3	6	4	8	3	6	7	15
600 - 700	4	8	3	6	4	8	3	6	5	10
700 - 800	4	8	3	6	3	6	3	6	5	10
800 - 900	4	8	2	4	3	6	3	6	3	6
900 - 1000										

Test No.	6		7		8		9		10	
Test Location	Road 6		Road 6		Road 6		Road 4		Road 4	
Chainage & Offset	CH90 R		CH110 L		CH130 R		CH274 R		CH264 R	
Material & Layer:	Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	4	8	2	4	2	4	4	8	4	8
100 - 200	4	8	2	4	3	6	3	6	3	6
200 - 300	3	6	2	4	2	4	3	6	2	4
300 - 400	4	8	3	6	4	8	4	8	4	8
400 - 500	3	6	3	6	3	6	3	6	4	8
500 - 600	3	6	6	13	3	6	4	8	4	8
600 - 700	4	8	8	18	3	6	UTP		3	6
700 - 800	4	8	11	20+	4	8			3	6
800 - 900	3	6	10	20+	7	15			2	4
900 - 1000										

Prepared by: CS Date: 17/05/2016

Checked by: JMJ Date: 17/05/2016

Authorised Signatory: Jack Mylett-Jones Date: 17/05/2016

This report should only be reproduced in full

*Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils.

LF14 Rev.5 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: test 6.5.2: 1988

Report No:	2015_1127LAG Rev.0
Project Name:	Station Road
Project Location:	Corner of Station and Nobilo Road
Project Number:	2015_1127
Test Date:	4/05/2016
Client:	CABRA Developments
Client Address:	
Client Reference:	

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY ACCREDITATION Nº: 1131

Test No.	11		12		13		14		15	
Test Location	Road 4		Road 4		Road 4		Road 4		Road 4	
Chainage & Offset	CH254 L		CH234 R		CH214 L		CH194 R		CH174 L	
Material & Layer:	Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	4	8	5	10	3	6	5	10	2	4
100 - 200	4	8	4	8	4	8	4	8	3	6
200 - 300	5	10	4	8	4	8	3	6	1	2
300 - 400	4	8	5	10	5	10	4	8	2	4
400 - 500	3	6	4	8	5	10	3	6	2	4
500 - 600	5	10	5	10	4	8	4	8	3	6
600 - 700	4	8	5	10	4	8	3	6	2	4
700 - 800	4	8	5	10	3	6	4	8	4	8
800 - 900	4	8	5	10	2	4	4	8	4	8
900 - 1000										

Test No.	16		17		18		19		20	
Test Location	Road 4		Road 4		Road 4		Road 4		Road 4	
Chainage & Offset	CH154 R		CH134 L		CH114 R		CH94 L		CH74 R	
Material & Layer:	Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	4	8	3	6	4	8	5	10	5	10
100 - 200	3	6	2	4	5	10	5	10	5	10
200 - 300	4	8	3	6	4	8	4	8	4	8
300 - 400	3	6	3	6	4	8	3	6	5	10
400 - 500	2	4	2	4	4	8	3	6	3	6
500 - 600	3	6	2	4	3	6	3	6	4	8
600 - 700	2	4	2	4	4	8	4	8	2	4
700 - 800	3	6	2	4	3	6	4	8	3	6
800 - 900	4	8	2	4	4	8	2	4	2	4
900 - 1000										

Prepared by: CS Date: 17/05/2016

Checked by: JMJ Date: 17/05/2016

Authorised Signatory: Jack Mynott-Jones Date: 17/5/2016

*Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils.

LF14 Rev.5 **Dynamic Cone Penetration (DCP) Test Report**

NZS 4402: test 6.5.2: 1988

Report No:	2015_1127LAG Rev.0
Project Name:	Station Road
Project Location:	Corner of Station and Nobilo Road
Project Number:	2015_1127
Test Date:	4/05/2016
Client:	CABRA Developments
Client Address:	
Client Reference:	

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY ACCREDITATION Nº: 1131

Test No.	21		22		23		24		25	
Test Location	Road 4		Road 4		Road 4		Road 4		Road 7	
Chainage & Offset	CH54 L		CH34 R		CH14 L		CH0 R		CH200 L	
Material & Layer:	Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	3	6	4	8	2	4	4	8	4	8
100 - 200	4	8	4	8	4	8	3	6	3	6
200 - 300	4	8	3	6	3	6	4	8	5	10
300 - 400	3	6	2	4	4	8	3	6	4	8
400 - 500	2	4	3	6	2	4	2	4	3	6
500 - 600	2	4	2	4	3	6	2	4	2	4
600 - 700	2	4	2	4	2	4	3	6	4	8
700 - 800	2	4	2	4	5	10	3	6	4	8
800 - 900	2	4	2	4	4	8	3	6	3	6
900 - 1000										

Test No.	26		27		28		29		30	
Test Location	Road 7		Road 7		Road 7		Road 7		Road 7	
Chainage & Offset	CH220 R		CH240 L		CH250 R		CH280 L		CH300 R	
Material & Layer:	Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	4	8	4	8	6	13	5	10	3	6
100 - 200	3	6	5	10	6	13	3	6	3	6
200 - 300	2	4	5	10	4	8	3	6	3	6
300 - 400	4	8	5	10	6	13	3	6	3	6
400 - 500	5	10	4	8	7	15	3	6	4	8
500 - 600	3	6	7	15	5	10	3	6	2	4
600 - 700	3	6	6	13	4	8	3	6	2	4
700 - 800	3	6	6	13	5	10	3	6	3	6
800 - 900	3	6	7	15	4	8	2	4	3	6
900 - 1000										

Prepared by: CS Date: 17/05/2016

Checked by: JMJ Date: 17/05/2016

Authorised Signatory: Jack Mylett-Jones Date: 17/05/2016

This report should only be reproduced in full

*Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils.

LF14 Rev.5 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: test 6.5.2: 1988

Report No:	2015_1127LAG Rev.0
Project Name:	Station Road
Project Location:	Corner of Station and Nobilo Road
Project Number:	2015_1127
Test Date:	4/05/2016
Client:	CABRA Developments
Client Address:	
Client Reference:	

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY ACCREDITATION Nº: 1131

Test No.	31		32		33		34		35	
Test Location	Road 7		Road 7		Road 7		Road 7		Road 7	
Chainage & Offset	CH320 L		CH340 R		CH360 L		CH380 R		CH400 L	
Material & Layer:	Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	2	4	2	4	1	2	2	4	3	6
100 - 200	3	6	2	4	2	4	1	2	3	6
200 - 300	2	4	2	4	2	4	2	4	2	4
300 - 400	2	4	2	4	2	4	2	4	3	6
400 - 500	2	4	2	4	2	4	2	4	2	4
500 - 600	2	4	1	2	2	4	2	4	4	8
600 - 700	2	4	2	4	1	2	2	4	2	4
700 - 800	3	6	2	4	2	4	2	4	3	6
800 - 900	2	4	1	2	2	4	2	4	2	4
900 - 1000										

Test No.	36		37		38		39		40	
Test Location	Road 7		Road 7		Road 7		Road 2		Road 2	
Chainage & Offset	CH420 R		CH440 L		CH460 R		CH345 R		CH340 L	
Material & Layer:	Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	3	6	2	4	3	6	5	10	3	6
100 - 200	3	6	2	4	3	6	4	8	2	4
200 - 300	3	6	2	4	4	8	4	8	3	6
300 - 400	3	6	3	6	4	8	3	6	2	4
400 - 500	3	6	4	8	4	8	4	8	3	6
500 - 600	3	6	5	10	3	6	3	6	1	2
600 - 700	3	6	7	15	4	8	2	4	2	4
700 - 800	2	4	9	20	3	6	2	4	2	4
800 - 900	2	4	9	20	3	6	3	6	2	4
900 - 1000										

Prepared by: CS Date: 17/05/2016

Checked by: JMJ Date: 17/05/2016

Authorised Signatory: Date: 17/05/2016

*Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils.

LF14 Rev.5 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: test 6.5.2: 1988

Report No:	2015_1127LAG Rev.0
Project Name:	Station Road
Project Location:	Corner of Station and Nobile Road
Project Number:	2015_1127
Test Date:	4/05/2016
Client:	CABRA Developments
Client Address:	
Client Reference:	

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY ACCREDITATION Nº: 1131

Test No.	41		42		43		44		45	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	CH320 R		CH300 L		CH280 R		CH260 L		CH243 R	
Material & Layer:	Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	3	6	3	6	4	8	3	6	3	6
100 - 200	4	8	3	6	3	6	3	6	3	6
200 - 300	3	6	3	6	3	6	3	6	2	4
300 - 400	3	6	2	4	4	8	3	6	2	4
400 - 500	3	6	2	4	3	6	5	10	3	6
500 - 600	2	4	2	4	2	4	7	15	1	2
600 - 700	2	4	1	2	2	4	8	18	2	4
700 - 800	1	2	1	2	2	4	11	20+	3	6
800 - 900	2	4	2	4	2	4	11	20+	2	4
900 - 1000										

Test No.	46		47		48		49		50	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	CH220 L		CH200 R		CH180 L		CH160 R		CH140 L	
Material & Layer:	Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	4	8	4	8	4	8	6	13	4	8
100 - 200	3	6	3	6	4	8	5	10	3	6
200 - 300	3	6	2	4	4	8	4	8	3	6
300 - 400	3	6	3	6	4	8	3	6	3	6
400 - 500	1	2	3	6	3	6	5	10	4	8
500 - 600	1	2	3	6	2	4	3	6	2	4
600 - 700	1	2	2	4	2	4	3	6	2	4
700 - 800	2	4	2	4	2	4	3	6	2	4
800 - 900	2	4	2	4	1	2	2	4	2	4
900 - 1000										

Prepared by: CS Date: 17/05/2016

Checked by: JMJ Date: 17/05/2016

Authorised Signatory: Jack Mynett-Jl Date: 17/05/2016

*Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils.

LF14 Rev.5 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: test 6.5.2: 1988

Report No:	2015_1127LAG Rev.0
Project Name:	Station Road
Project Location:	Corner of Station and Nobile Road
Project Number:	2015_1127
Test Date:	4/05/2016
Client:	CABRA Developments
Client Address:	
Client Reference:	

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY ACCREDITATION No: 1131

Test No.	51		52		53		54		55	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	CH120 R		CH100 L		CH80 R		CH60 L		CH40 R	
Material & Layer:	Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay		Subgrade / Clay	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	4	8	4	8	4	8	4	8	4	8
100 - 200	4	8	3	6	3	6	4	8	4	8
200 - 300	3	6	3	6	2	4	4	8	3	6
300 - 400	2	4	3	6	3	6	3	6	5	10
400 - 500	3	6	3	6	4	8	4	8	3	6
500 - 600	2	4	4	8	3	6	4	8	6	13
600 - 700	2	4	3	6	4	8	6	13	3	6
700 - 800	3	6	3	6	6	13	9	20	7	15
800 - 900	2	4	3	6	3	6	5	10	4	8
900 - 1000										

Test No.	56									
Test Location	Road 2									
Chainage & Offset	CH20 L									
Material & Layer:	Subgrade / Clay									
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	4	8								
100 - 200	2	4								
200 - 300	4	8								
300 - 400	4	8								
400 - 500	5	10								
500 - 600	4	8								
600 - 700	4	8								
700 - 800	4	8								
800 - 900	4	8								
900 - 1000										

Prepared by: CS Date: 17/05/2016

Checked by: JMJ Date: 17/05/2016

Authorised Signatory: Date: 17/5/2016

*Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils.

LF12 Rev. 5 Aggregate Field Density NDM - Backscatter Report

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Project:	Cnr Station Road and Nobilo Road
Project No:	2015_1127
Location:	Huapai
Report No:	2015_1127LAH Rev.0
Report Date:	23/11/2016
Client:	Cabra Developments Ltd
Client Address:	PO Box 197, Orewa
Client Reference:	

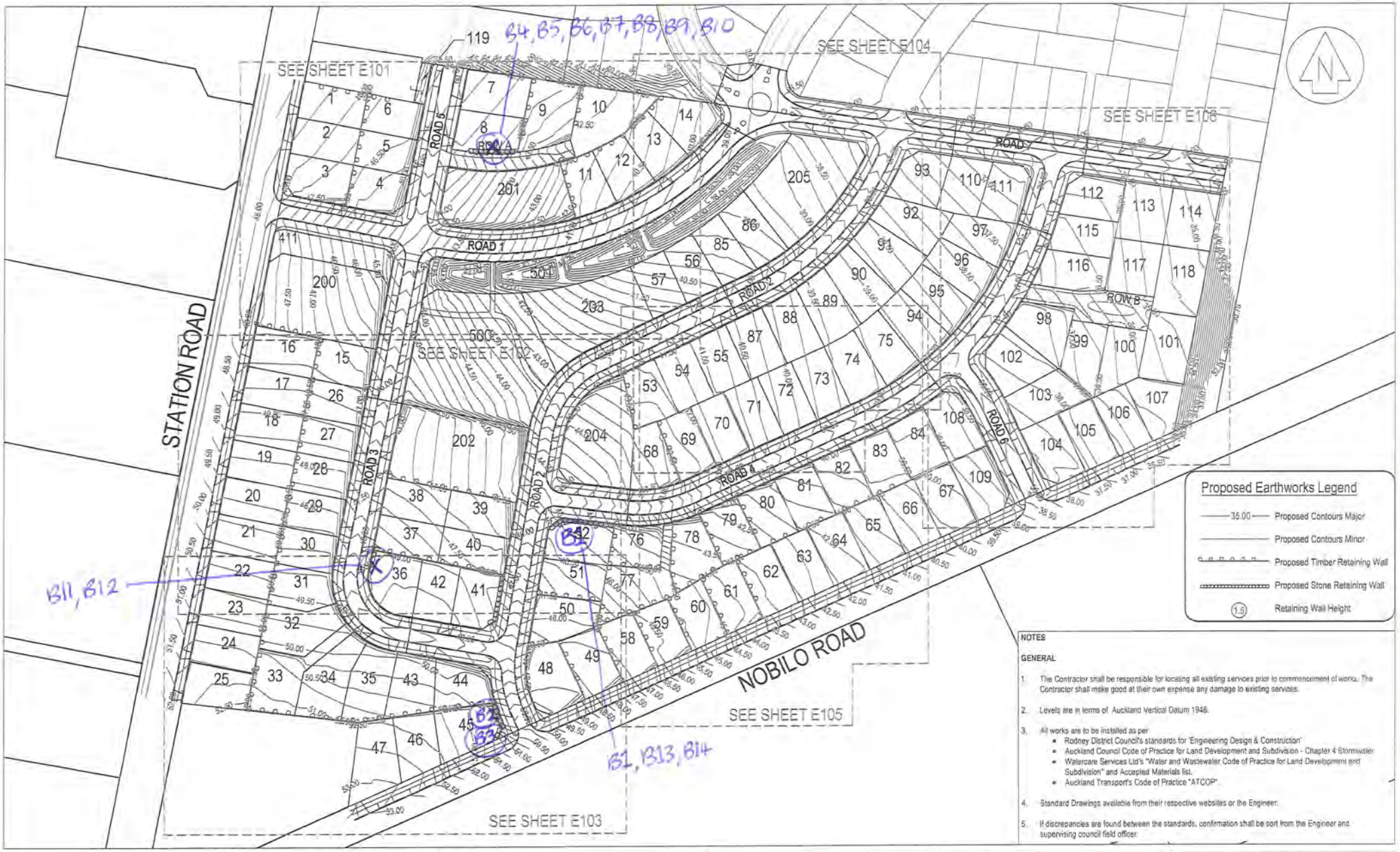
Test Methods: NZS 4407.3.1:2015; NZS 4407.4.3:2015

Notes: Testing Locations Selected By: CMW Field Staff

Measurements marked * are not accredited and are outside the laboratory's scope of accreditation

Date Sampled	Sample No.	Test Location Details	Material Details						Field and Testing Data					Comments
			Material	Quarry	Material Data Source	OMC* (%)	MDD* (t/m³)	SD* (t/m³)	Gauge Wet Density (t/m³)	Gauge Dry Density (t/m³)	Gauge Water Content (%)	Gauge Compaction (%) *	Calculated Total Voids (%) *	
12/07/2016	B1	Keystone Wall - Lot 52	GAP 40	Whangaripo	Winstone Aggregates	3.9	2.29	2.7	2.4630	2.3647	4.2	103.3	12	
	B2	Keystone Wall - Lot 45	GAP 40	Whangaripo	Winstone Aggregates	3.9	2.29	2.7	2.4498	2.3624	3.7	103.2	13	
	B3	Keystone Wall - Lot 45	GAP 40	Whangaripo	Winstone Aggregates	3.9	2.29	2.7	2.3608	2.2931	2.9	100.1	15	
22/07/2016	B4	Keystone Wall - Lot 8	GAP 40	Whangaripo	Winstone Aggregates	3.9	2.29	2.7	2.1633	2.0591	5.1	89.9	24	
	B5	Keystone Wall - Lot 8	GAP 40	Whangaripo	Winstone Aggregates	3.9	2.29	2.7	2.1446	2.0515	4.5	89.6	24	
	B6	Keystone Wall - Lot 8	GAP 40	Whangaripo	Winstone Aggregates	3.9	2.29	2.7	2.2112	2.1065	5.0	92.0	22	
	B7	Keystone Wall - Lot 8	GAP 40	Whangaripo	Winstone Aggregates	3.9	2.29	2.7	2.2012	2.0885	5.4	91.2	23	
	B8	Keystone Wall - Lot 8	GAP 40	Whangaripo	Winstone Aggregates	3.9	2.29	2.7	2.2274	2.1032	5.9	91.8	22	
27/07/2016	B9	Keystone Wall - Lot 8	GAP 40	Whangaripo	Winstone Aggregates	3.9	2.29	2.7	2.1322	1.9905	7.1	89.9	26	
	B10	Keystone Wall - Lot 8	GAP 40	Whangaripo	Winstone Aggregates	3.9	2.29	2.7	2.1094	2.0151	4.7	88.0	25	
5/08/2016	B11	Keystone Wall - Lot 36	Manarc MR-9	Whangaripo	Winstone Aggregates	3.9	2.29	2.7	2.1092	1.9671	7.2	85.9	27	
	B12	Keystone Wall - Lot 36	Manarc MR-9	Whangaripo	Winstone Aggregates	3.9	2.29	2.7	2.2190	2.0690	7.2	90.3	23	
3/11/2016	B13	Keystone Wall - Lot 52	GAP 40	Whangaripo	Winstone Aggregates	3.9	2.29	2.7	2.3090	2.1759	6.1	94.6	19	
	B14	Keystone Wall - Lot 52	GAP 40	Whangaripo	Winstone Aggregates	3.9	2.29	2.7	2.3311	2.1893	6.5	95.2	19	

Created By: TG Date: 23/11/2016
Checked By: TG Date: 24/11/2016
Authorised Signatory: Date: 14/11/2016



2015_1127_AH Cnr Station Road and Nobilo Road

Pg 2 of 2

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

R3 AMENDED FOR 1m KEYSTONE WALLS	KM	08/15
R2 AMENDED FOR REVISED LAYOUT	KM	10/14
R1 LEVELS AMENDED, BATTERS ADDED	KM	10/14
REVISION (DESCRIPTIONS)	NAME	DATE

	NAME	DATE
SURVEYED		
DESIGNED	KM	10/14
DRAWN	KM	10/14
CHECKED		
APPROVED		

FOR ENGINEERING CONSENT

This plan and accompanying report(s) have been prepared for the purpose of obtaining a resource consent only and for no other purpose. Use of this plan and/or the information on it for any other purpose is at the user's risk.

CLIENT

CABRA DEVELOPMENTS LTD
CNR STATION ROAD AND
NOBILO ROAD, HUAPAI

DRAWING TITLE

PROPOSED CONTOURS
Sheet 1 of 7

ORIGINAL SCALE 1:1500	ORIGINAL SIZE A3	REVISION NO R3
DATE 1/10/2014	CAD REFERENCE 32522_E100 Cont p .dwg	SHEET NO E100
DIRECTORY d:\32522\ACAD\		JOB NO 32522

Appendix E

Producer Statements

CMW Geosciences

23 November 2016 Ref: 2015_1127AF Rev.0

Cabra Developments Limited
PO Box 197
Orewa 0946

Attention: Duncan Unsworth

RE: CERTIFICATION FOR THE CONSTRUCTION OF ALL TIMBER POLE RETAINING WALLS AND KEYSTONE WALLS AT THE CORNER OF STATION AND NOBILO ROAD, HUAPAI - ABA-1022803 & SLC-67086

CMW Geosciences (NZ) Limited (CMW) have visited the above site, legally described as Lot 1 DP 318693, Lot 2 DP 318693 & Lot 2 DP 137997 between February and August 2016 to observe the ground conditions and construction details relating to the construction of timber pole retaining walls and segmental block retaining walls as part of the subdivision development.

Our work has included review of the following documents and drawings:

- Conditions of Auckland Council Building Consent referenced ABA-1022803 and issued 19 February 2016;
- Conditions of Auckland Council Resource Consent referenced SLC-67086;
- Proposed Contour Plan prepared by Cato Bolam Consultants, referenced Job No. 32522 Sheet No. E100 Rev No. R5 and dated 01 October 2014;
- Geotechnical Investigation Report prepared by CMW, referenced 2015_1127AB Rev.2 and dated 24 August 2015;
- Technical Memorandum for Retaining Wall Pipe Crossings prepared by CMW, referenced 2015_1127AD Rev.0 and dated 30 October 2015.

Our observations and testing for the timber walls included;

- Assessment of soil strengths in the exposed pile foundation excavations and retained soils;
- Construction observations for timber pole retaining walls including:
    - Pile Size;
    - Pile Depth;
    - Timber pole size, treatment stamps and placement;
    - Drainage materials and installation, including outlet locations;
    - Lagging construction;
    - Bridging details for bridging of drainage installed during the subdivision works.

Our inspections also took into account pole layout at boundaries in accordance with our design details for the walls to be structurally discontinued at the boundary of each lot in the future if required. Where groundwater was observed within the piles holes, contractors were advised to pump water out before pouring concrete.

Measured vane shear strengths within the pile hole bases and in the sides were generally in excess of 60kPa as assumed in the design.

Our observations and testing for the keystone walls incorporated:

- Assessment of soil strengths of the exposed foundation excavations and retained soils;
- Drainage installation including outlet locations;
- Geogrid reinforcement placement (type, length, vertical spacing and tension);
- Hardfill compaction.

Our construction observations also included additional geogrid placement for service crossings in accordance with our design details.

On the basis of our observations and testing, we consider that the construction of the timber pole retaining walls and keystone walls across the subdivision have been undertaken in accordance with the approved documentation described above and are in accordance with the requirements and/or recommendations of both the Geotechnical Investigation Report and the technical memorandum prepared by CMW.

Copies of the PS3 documentation from the contractors who constructed the respective walls, together with a PS3 for the balustrades installed above the walls will be provided with the application for CCC (Code Compliance Certificate) together with copies of the consent notices covering discharge of retaining wall drainage onto respective lots.

For and on behalf of
CMW Geosciences NZ Ltd

Richard Knowles

Principal Geotechnical Engineer, CPEng

Attachments: Producer Statement - Construction Review

Building Code Clause(s) B1, B2

PRODUCER STATEMENT – PS4 – CONSTRUCTION REVIEW

(Guidance notes on the use of this form are printed on page 2)

ISSUED BY: R.J.KNOWLES of CMW GEOSCIENCES (NZ) LIMITED
(Construction Review Firm)

TO: CABRA DEVELOPMENTS LIMITED
(Owner/Developer)

TO BE SUPPLIED TO: AUCKLAND COUNCIL
(Building Consent Authority)

IN RESPECT OF: CONSTRUCTION OF TIMBER POLE RETAINING WALLS & KEYSTONE WALLS
(Description of Building Work)

AT: CORNER OF STATION ROAD & NOBILO ROAD, HUAPAI
(Address)
LOT 1 & 2 **DP** 318693 (lot 1 & 2) and 137997 (lot2) **SO**

CMW GEOSCIENCES (NZ) LIMITED has been engaged by CABRA DEVELOPMENTS LIMITED
(Construction Review Firm)
To provide ☐CM1 ☐CM2 ☐CM3 ☐CM4 ☐CM5 *(Engineering Categories)* or ☐ observation as per agreement with owner/developer

or ☒other REFER TO ATTACHED DOCUMENT REFERENCED 2015_1127AF REV.0 DATED 23 NOVEMBER 2016.services
(Extent of Engagement)
in respect of clause(s) B1, B2 of the Building Code for the building work described in

documents relating to Building Consent No. ABA-1022803 & RESOURCE CONSENT SLC-67086 and those relating to

Building Consent Amendment(s) Nos. N/A issued during the

course of the works. We have sighted these Building Consents and the conditions of attached to them.

Authorised instructions / variations(s) No. N/A (copies attached)

or by the attached Schedule ☐ have been issued during the course of the works.

On by the basis of ☒this ☐these review(s) and information supplied by the contractor during the course of the works and **on behalf of the firm** undertaking this Construction Review, **I believe on reasonable grounds** that ☐All ☒Part only of the building works have been completed in accordance with the relevant requirements of the Building Consent and Building Consent Amendments identified above, with respect to Clause(s) B1, B2 of the Building Code.
I also believe on reasonable grounds that the persons who have undertaken this construction review have the necessary competency to do so.

I, R.J.KNOWLES am: ☒CPEng No. 160049 (AUCKLAND COUNCIL AUTHOR #2342)....
(Name of Construction Review Professional)
☐Reg Arch No. .....

I am a Member of : ☒IPENZ ☐NZIA and hold the following qualifications: BE(CIVIL), CPEng

The Construction Review Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than $200,000*.
The Construction Review Firm is a member of ACENZ : ☐

SIGNED BY R.J.KNOWLES **ON BEHALF OF** .CMW GEOSCIENCES (NZ) LIMITED

Date: 24/11/16 Signature:

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of $200,000.*

This form is to accompany **Forms 6 or 8 of the Building (Form) Regulations 2004** for the issue of a Code Compliance Certificate.

B.03.VI SIXTH SCHEDULE
PRODUCER STATEMENT

ISSUED BY:	**OPIE CONTRACTORS LTD** ("The Contractor")
TO:	**Cabra Developments Ltd** ("The Principal")
FOR:	**Auckland Council (Rodney)** (Territorial Authority or any authorised agent of the Territorial Authority)
IN RESPECT OF:	RG ~~**Earthworks, Retaining Walls**~~, **Roading, Drainage, Water and Services**
AT:	**118 Lot Residential Development, Cnr of Station Road and Nobilo Road, Huapai**

Opie Contractors Ltd("The Contractor") has contracted to **Cabra Developments Ltd** (Principal) to carry out and complete certain contract works in accordance with relevant the New Zealand Building Codes in conformity with regulations and by-laws of the local authority upon whose jurisdiction the site is located and in accordance with any Act and/or Code of Practice.

I Ricky Giddy a duly authorised representative of **Opie Contractors Ltd** ("The Contractor") believe on reasonable grounds that **Opie Contractors Ltd** (The Contractor") has carried out and completed

~~ALL~~	PART ONLY

(Delete as applicable)

as specified in the attached drawings and/or technical information provided for the contract works.

Separable Portion 1	Separable Portion 2	Separable Portion 3	Separable Portion 4

CONTRACTOR: **Opie Contractors Ltd**
P.O. Box 174, Silverdale 0944
TELEPHONE: **09 426 9781**
FACSIMILE: **09 426 6896**
E-MAIL: **rick@opie.co.nz**

SIGNATURE Ricky Giddy **NAME** Ricky Giddy **DESIGNATION**

Dated this 24 day of November 2016

CERTIFICATION OF SEDIMENT & EROSION CONTROL DEVICES

ISSUED BY:	**Bob Hick Earthmoving Limited** ("The Sub-Contractor)
TO:	**Opie Contractors Limited (**The Head- Contractor)
FOR:	**Auckland Council (Rodney)** (Territorial Authority or any authorised agent of the Territorial Authority)
IN RESPECT OF:	**Earthworks and Timber Retaining Walls**
AT:	**118 Lot Residential Development, Cnr of Station Road and Nobilo Road, Huapai**

Bob Hick Earthmoving Limited ("The Sub-Contractor) has contracted **Opie Contractors Limited (**The Head- Contractor) to carry out and complete certain contract works in accordance with the relevant New Zealand Building Codes in conformity with regulations and by-laws of the local authority upon whose jurisdiction the site is located and in accordance with any Act and/or Code of Practice.

I, Robert Hick, a duly authorised representative of **Bob Hick Earthmoving Limited** ("The Sub-Contractor) believe on reasonable grounds that **Bob Hick Earthmoving Limited** ("The Sub-Contractor) has constructed sediment and erosion control devices as specified in the attached drawings and/or technical information provided for in the contract works and the local authority upon whose jurisdiction the site is located

CONTRACTOR:	**Bob Hick Earthmoving Ltd**
	P.O. Box 208, Albany 0755
TELEPHONE:	**09 4129126**
FACSIMILE:	**09 4129471**
E-MAIL:	bobhick@xtra.co.nz

RC Hick

SIGNATURE

Robert C Hick
NAME

Director
DESIGNATION

Dated this 14th day of November 2016

PRODUCER STATEMENT

ISSUED BY:	**Bob Hick Earthmoving Limited** ("The Sub-Contractor)
TO:	**Opie Contractors Limited (**The Head- Contractor)
FOR:	**Auckland Council (Rodney)** (Territorial Authority or any authorised agent of the Territorial Authority)
IN RESPECT OF:	**Earthworks and Timber Retaining Walls**
AT:	**118 Lot Residential Development, Cnr of Station Road and Nobilo Road, Huapai**

Bob Hick Earthmoving Limited ("The Sub-Contractor) has contracted to **Opie Contractors Limited (**The Head- Contractor) to carry out and complete certain earthworks and construction of timbre retaining walls in accordance with relevant the New Zealand Building Codes in conformity with regulations and by-laws of the local authority upon whose jurisdiction the site is located and in accordance with any Act and/or Code of Practice.

I, Robert Hick, a duly authorised representative of **Bob Hick Earthmoving Limited** ("The Sub-Contractor) believe on reasonable grounds that **Bob Hick Earthmoving Limited** ("The Sub-Contractor) has carried out and completed earthworks and timber retaining wall construction as specified in the attached drawings and/or technical information provided for the contract works for Separable Portion 1 and Separable Portion 2.

CONTRACTOR:	**Bob Hick Earthmoving Ltd**
	P.O. Box 208, Albany 0755
TELEPHONE:	**09 4129126**
FACSIMILE:	**09 4129471**
E-MAIL:	bobhick@xtra.co.nz

RC Hick

SIGNATURE

Robert C Hick
NAME

Director
DESIGNATION

Dated this 14th day of November 2016

Producer statement construction (PS3)
General construction work

Auckland Council
Te Kaunihera o Tāmaki Makaurau

All sections of this form must be completed

TO BE COMPLETED BY THE PERSON WHO HAS UNDERTAKEN THE BUILDING WORK

Author name:	WILLIAM CAGE	Building consent No:	ABA-102283
Author company:	CAGE CONSTRUCTION LTD	Author Registration No:	N/A
Description of building work:	KEYSTONE RETAINING WALLS & ASSOCIATED WORKS		
Legal description:	LOT 1 DP 318693 LOT 2 DP 318693 LOT 2 DP 137797		
Site address:	95 STATION RD HEAPAI LOT 2 DP 318693 NOBILO RD		

NZBC clauses: (circle as applicable)

B1	B2	C1	C2	C3	C4	D1	D2	E1	E2	E3	F1
F2	F3	F4	F5	F6	F7	F8	G1	G2	G3	G4	G5
G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	H1	

I have sighted the above building consent and read the attached conditions of consent and confirm that I have undertaken the building work described above in accordance with the consented plans and specifications.

I understand that Council will rely upon this producer statement, for the purposes of establishing compliance with the above building consent.

Signature: [signature] Date: 24-11-2016

Tradesperson's contact details:

Address:	4 WATERFRONT RD MANGERE BRIDGE Postcode: 2022		
Business:	RETAINING WALL CONSTRUCTION	Fax:	
Mobile:	021-3777-58	Email	blockheadz@xtra.co.nz

COUNCIL USE ONLY

☐ Central ☐ Henderson ☐ Manukau ☐ Orewa ☐ Papakura ☐ Pukekohe ☐ Takapuna

Received by:		Register checked:	YES	NO
Signature:		Registration current:	YES	NO
Producer statement accepted as establishing compliance with the consented plans:			YES	NO

Producer statement construction (PS3)
General construction work

Auckland Council
Te Kaunihera o Tāmaki Makaurau

All sections of this form must be completed

TO BE COMPLETED BY THE PERSON WHO HAS UNDERTAKEN THE BUILDING WORK

Author name:	Ray Herbert	Building consent No:	
Author company:	North Harbour Fencing	Author Registration No:	
Description of building work:	Supply & install fencing to timber & keystone retaining walls		
Performance standard for maintenance and inspection, if applicable	☑ N/A		
Legal description:			
Site address:	Station Rd, Hlapai		

NZBC clauses: (select as applicable)

B1	B2	C1	C2	C3	C4	C5	C6	D1	D2	E1	E2	E3
F1	F2	F3	F4	F5	F6	F7	F8	G1	G2	G3	G4	G5
G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	H1		

I have sighted the above building consent and read the attached conditions of consent and confirm that I have undertaken the building work described above in accordance with the consented plans and specifications.

I understand that Council will rely upon this producer statement, for the purposes of establishing compliance with the above building consent.

Signature: R Herbert Date: 23/11/16

Tradesperson's contact details:

Address:	51a Founder Rd, Silverdale	Postcode:	0932
Business:	09 443 8692	Fax:	/
Mobile:	027 289 5846	Email	ray@nhfencing.co.nz

COUNCIL USE ONLY

☐ Central ☐ Henderson ☐ Manukau ☐ Orewa ☐ Papakura ☐ Pukekohe ☐ Takapuna

☐ Accepted in support of inspection ☐ Accepted instead of inspection

Register checked: Council ☐ LBP ☐ N/A ☐

Name: Date:

Producer statement accepted as establishing compliance with the consented plans: YES ☐ NO ☐

Producer statements are accepted solely at Auckland Council's discretion; please refer to the Producer Statement Policy which can be found on Councils website for further details

http://www.aucklandcouncil.govt.nz/EN/ratesbuildingproperty/consents/Consent%20documents/ac2301producerstatementpolicy.pdf